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THESIS

BUSINESS PROCESS REENGINEERING WITH KNOWLEDGE VALUE ADDED IN SUPPORT OF THE DEPARTMENT OF THE NAVY CHIEF INFORMATION OFFICER

by

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and
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September 2003

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**BUSINESS PROCESS REENGINEERING WITH KNOWLEDGE VALUE
ADDED IN SUPPORT OF THE DEPARTMENT OF THE NAVY CHIEF
INFORMATION OFFICER**

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ABSTRACT

As the Department of Defense (DoD) begins transitioning to face the new global threats of terrorism, the new requirements of a refocused National Strategy will inherently force the DoD to transform its processes in support of the new National Strategy. In the next few years the technology used to support the DoD will continue to grow with the new demands thus, the DoD will have achieve transformation at all levels enterprise-wide. "Transformation" or radical change has been occurring successfully in the corporate business world for over 25 years and through this transformation the e-business technology has created an exponential growth in the knowledge producing information exchange systems. As the DoD looks to the e-business world for methodologies and solutions to capture this knowledge and manage it, it must also look for a surrogate definition of value or revenue that can be used as a measurement of return on the knowledge. This thesis will seek to define this value by presenting the e-business methodologies called Return on Knowledge (ROK), Knowledge Value Analysis (KVA) and Business Process Reengineering (BPR) by developing a web-enabled environment called the Transformation Information Technology Enabler (TITE) as a DoD transformation solution.

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LIST OF ACRONYMS

ABC	Activity Based Costing
ADO	ActiveX Data Object
ASP	Application Server Page
BPR	Business Process Re-engineering
DCF	Discounted Cash Flow
DoD	Department of Defense
DoN	Department of the Navy
DoN-CIO	Department of the Navy Chief Information Officer
DSN	Data Server Name
FA	Functional Area
GUI	Graphical User Interface
HTML	Hyper Text Markup Language
ID	Identification
IT	Information Technology
ITE	Information Technology Enabler
KA	Knowledge Allocation
KVA	Knowledge Value Added
LAN	Local Area Network
LT	Learning Time
MBO	Management By Objectives
MS	Microsoft
ODBC	Open Database Connection

RLT	Real Learning Time
ROK	Return On Knowledge
SECDEF	Secretary of Defense
TITE	Transformation Information Technology Enabler
TLT	Total Learning Time
TQL	Total Quality Leadership
TQM	Total Quality Management
WAN	Wide Area Network
WWW	World Wide Web

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EXECUTIVE SUMMARY

Problem: Standardized definition and methodologies of Transformation within the DoD

Transformation, as we use the term, is based upon organizational change, created from within, but stimulated from an external source. The term "transformation" implies a radical change such that the outcomes, outputs, processes or even the enterprise itself may become an entirely different organization. Depending on the specific needs of the organization or process this change may be a radical change or it may be incremental change. The outcomes of a specific enterprise within the DoD or the DoD enterprise itself have endless objectives and goals therefore the problem is how does an organization change or "transform" to meet the changing National Security Strategy? How does the DoD identify what organizations, processes etc fall short of the New National Security Strategy and transform them all together.

The extent of the transformation efforts that the DoD desires to achieve over the coming years has not yet been defined and will be influenced by such factors as the budget, political desires and political will of the administration, the successes that are achieved within the DoD and industry, as well as the advances in technology.

Implied problem #1: What methodologies should the DoD use to achieve transformational goals.

Businesses world-wide have been undergoing radical change for the last 25 years. As the customer's desires and demands on high quality goods and services have steadily increased, the competitive corporate world also had to change the way it thinks and the way that goods and services are produced to meet the customer's high demands. In the past the DoD has adopted proven "change management" methodologies from the corporate world. Some of these methodologies include Total Quality Management (or Leadership), Discounted Cash Flow, and the Balanced Score Card. These

methodologies have worked well for companies that have needed to undergo change to meet the changing demands of customers but they fall short of the ability to measure change prior to making the change.

A common prediction methodology called Return on Investment (ROI) has been used in industry for decades. The ROI index on an investment of money for a new system in a process can be expressed using the Return on Investment (ROI) equation:

$$ROI = \frac{REVENUE}{COST}$$

The ROI formula allows a business to determine what its rate of return is on a given investment to determine if the investment is a sound decision and it allows for multiple analyses on alternative investments to be accomplished and compare these rates of return for a "best solution." The problem with the past process "change methods" discussed above are reactive, in that they react to change instead of predict it. In other words, measurements are taken from samplings after a process change has been integrated.

The ROI index provides a good associative leeway into the exploration of change for the DoD. The DoD does not generate revenue on any of its investments and therefore ROI implicitly can not be applied to the DoD's investments. In the "knowledge management" arena of the corporate e-Business world the ability to measure and allocate revenue to the "knowledge" within a process has lead to a new predictive index called Return on Knowledge (ROK). ROK index implies that an enterprises processes uses people and systems (hardware, software, machinery, etc.) and that these people and systems contain the "corporate" knowledge of the enterprise. If any one person or part of the system is removed from the process the "knowledge" within that person or system is no longer part of the process and a new person or system will have to be populated with the knowledge again and this takes time and money. Because time is money and money has value then the value of that knowledge can be measured. The ROK method described

by Dr. Thomas Housel and Dr. Arthur Bell is called Knowledge Value Added (KVA). The technique uses the three approaches[1] described in Table 1:

- Learning Time Approach
- Process Description Approach
- Binary Query Method

Steps	Learning time	Process description	Binary query method
1.	Identify core process and its subprocesses.		
2.	Establish common units to measure learning time.	Describe the products in terms of the instructions required to reproduce them and select unit of process description.	Create a set of binary yes/no questions such that all possible outputs are represented as a sequence of yes/no answers.
3.	Calculate learning time to execute each subprocess.	Calculate number of process instructions pertaining to each subprocess.	Calculate length of sequence of yes/no answers for each subprocess.
4.	Designate sampling time period long enough to capture a representative sample of the core process's final product/service output.		
5.	Multiply the learning time for each subprocess by the number of times the subprocess executes during sample period.	Multiply the number of process instructions used to describe each subprocess by the number of times the subprocess executes during sample period.	Multiply the length of the yes/no string for each subprocess by the number of times this subprocess executes during sample period.
6.	Allocate revenue to subprocesses in proportion to the quantities generated by step 5 and calculate costs for each subprocess.		
7.	Calculate ROK, and interpret the results.		

Table 1.   Approaches to KVA (From: Housel and Bell, 2001)

This technique measures the amount of knowledge within a process and allocates revenue to that knowledge and states that knowledge can be measured in terms of revenue. The ROK index looks like this:

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[1] Of these three approaches, learning time is most easily measured with in the DoD because training and experience can be definitively measured.

$$ROK = \frac{KNOWLEDGE}{COST}$$

Now that a process can be measured with an index as it is now, then new processes or several "process alternatives" can be adequately compared to each other based on the ROK index of each process so that implementation of the best "process alternative" can begin. The challenge for the DoD will be to define a surrogate or surrogates for revenue and then the DoD can begin to measure the value of knowledge within its processes. It is also crucial to note that KVA analysis has been proven to measure ROK at both the enterprise level and at the sub-process levels.

Implied Problem #2:   **Standardization of KVA analyses**

How the DoD standardizes KVA methodology to achieve transformational goals can be can be conducted using the framework of Business Process Reengineering (BPR). BPR as described by Omar El Sawy, is achieved within three phases (Figure 1):

- Phase 1: Scoping phase

  - This phase is used to define the inputs to the process undergoing change and the desired output to achieve. This phase keeps the BPR team focused and on course throughout the BPR process

- Phase 2: Modeling, Analysis, and Redesign phase

  - In this phase a model of the current or "as-is" process is drafted, analysis of the As-Is is conducted and then future process alternatives or "To-Be" processes can be modeled, analyzed for best performer and then the plan for phase 3

- Phase 3: Planning Process Integration phase

  - This phase is designated for drafting a plan for integrating the new process alternative for smooth, seamless integration of the new process into the current organization.
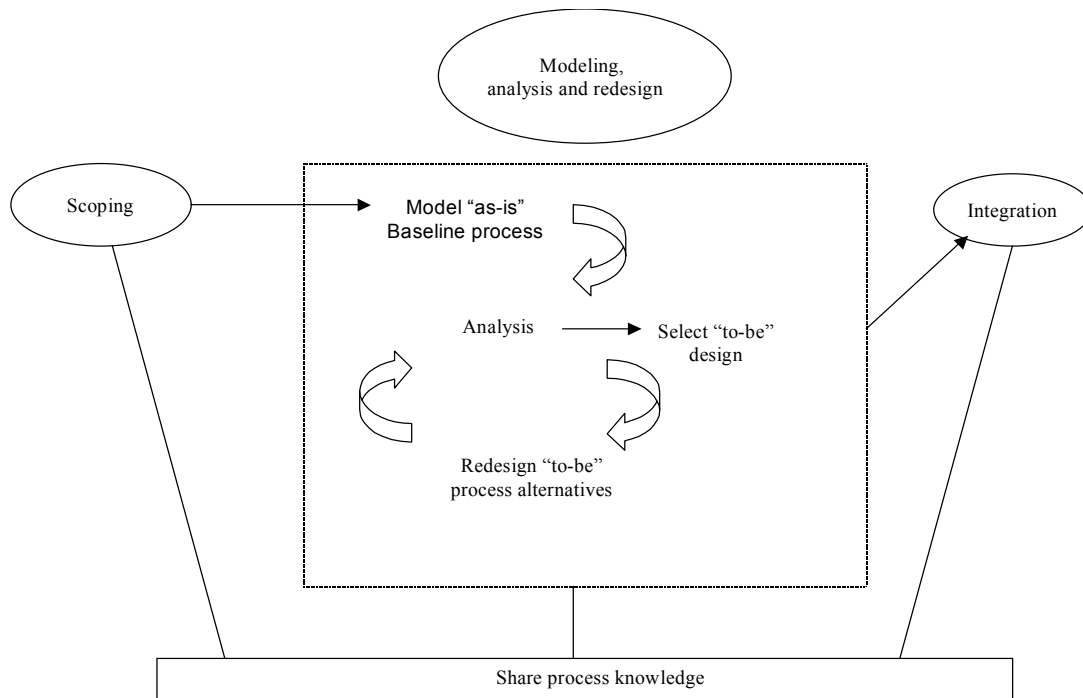
Figure 1.   Phases of Business Process Reengineering (From: El Sawy, 2001)

The KVA analysis method described by Housel and Bell is performed in Phase 2. In order to maintain a formal standardized transformation program within the DoD both formal policy and tools based on BPR and KVA should be easily accessible to all users in the DoD. Therefore, it is incumbent upon the DoD to leverage information technology enablers (ITE) to guide the user through the process of BPR utilizing KVA as the analysis tool. To make it easily accessible the Transformation ITE (TITE) should be web enabled with a client application server that guides, teaches and assists the user throughout transformational efforts at all levels of the DoD.

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I.   INTRODUCTION

To defend freedom in the 21st Century, you will have to bring innovation,
flexibility and agility into your progressively more important posts. Don't
be afraid to think for yourself, to take risks and to try new things.

                  – Secretary of Defense Donald Rumsfeld at the Hudson Institute

A.   PURPOSE

The purpose of this thesis is to determine whether "transformation" as defined by the Department of Defense (DoD) can be defined, measured and standardized using the e-business concepts of Business Process Engineering (BPR) and Knowledge Value Added (KVA).   Additionally, this thesis will document the efforts for a pilot transformation web-site intended to document and automate many of the transformation processes.

The DoD, under the leadership of the Secretary of Defense (SECDEF) Donald Rumsfeld, has undertaken a long-term effort to transform the operations, integration and business processes of the department. While many of the issues that Secretary Rumsfeld is working to address are beyond the scope and applicability of BPR, there are many that can fit within the guidelines we develop in this thesis. BPR as supported by KVA can be a powerful tool for determining and defining more effective methodologies for conducting business operations within and between organizations.

B.   BACKGROUND

What triggers the need for change in human beings and in organizations? Change can be the result of many different stimuli that, in the long term, make it easier to change than it is to stay the same. Sometimes the pressures for change or transformation can be stimulated from an external source such as a spouse or friend or if the change needs to take place for an organization, that stimulus can be a bad quarterly report or a big loss in stock value.

Transformation, as we use the term in this document, is based upon organizational change, created from within, but stimulated from an external source. Transformation can take on many different meanings, and dependent upon the specific needs of any organization or process, the actual change that takes place may be large or very small.

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C. RESEARCH QUESTIONS

In order to determine whether the concepts of Business Process Re-Engineering and Knowledge Value added can be effectively applied to the Department of Defense and its vision of transformation, the following research questions need to be answered:

- Can transformation be defined, measured, standardized and implemented for the Department of the Navy using the e-business concepts of Business Process Re-engineering and Knowledge Value Added?

- Can e-business re-engineering concepts be effectively applied to the Department of the Navy's transformation efforts?

- Can the Navy's transformation efforts be captured within the context of Knowledge Value Added and applied enterprise wide?

- Can a transformation web portal be piloted that will allow for the capture and benchmarking of BPR and KVA data for the Department of the Navy?

D. SCOPE

This thesis will cover the conceptual aspects of the definition and application of Business Process Re-engineering and Knowledge Value Added to the Department of the Navy. Through an in-depth review of the current literature on the goals of the DoN transformation efforts as well as the industry literature on BPR and KVA, this thesis will integrate the two and determine where the re-engineering concepts are appropriate for use within the DoN transformation efforts. Additionally we will show a comprehensive review of the current policy in place within DoD/DoN to determine whether there is conflict between goals and current policy.

The extent of the transformation efforts that DoN desires to achieve over the coming years has not yet been defined and will be influenced by such factors as the budget, political desires and political will of the administration, the successes that are achieved within the DoN and industry as well as the advances in technology. This thesis will not attempt to "crystal ball" the future as to the influences of any single factor, but will assemble a coherent methodology that could be used to continually influence change.

As a part of this effort we will also create a pilot web-site, developed in Macromedia Dreamweaver, that will serve as a launching platform for further research and development. This web-site is not intended to be an end-state for the DoN

transformation efforts, but rather a demonstration of what might be possible with further research and investment. This will serve as a pilot for a future vision that will include a web-services function where Commanders can prototype applications to test BPR ideas and concepts. Future concepts will also include a comprehensive library of projects that have been bench-marked and are available for review.

E.   METHODOLOGY

The methodology for this thesis research includes the following steps:

- Conduct a comprehensive literature search of books, journal articles, and Internet based materials

- Conduct a comprehensive review of government reports concerning DOD transformation efforts, force structure initiatives, optimization efforts, and Department of Defense Directives regarding transformation from a business process perspective

- Conduct interviews, as required, to gain critical insight and understanding of current government policy governing the roles of the Department of Defense- Optimization Projects, and military organizations

- Develop a prototype web-based information resource that will provide the following capabilities:

    - Best Practices Review page

    - Updated benchmarks for core business practices

    - Case studies for "How-to" training

    - Collaborative pages for users to share experiences

    - A knowledge management area for the use of KVA

    - A review area for KVA heuristics

    - Research area to report on-going research on BPR and KVA

G.   ORGANIZATION

This thesis research will be organized in the following manner:

Chapter I will consist of an outline and overview of the thesis research including background, scope, methodology and organization.

Chapter II will consist of a description and overview of Business Process Reengineering. This will include a conceptual overview of BPR and a view of BPR in the context of DoN Transformation efforts. Inclusive in this overview will be a look at the proposed DoD transformation effort and how BPR can apply to that effort.

Chapter III will be an overview and description of the Knowledge Value Added concept and its potential applications. This will include a discussion of the concept of KVA and a description of KVA in the context of BPR. Additionally we will showcase selected case studies of KVA to demonstrate its applicability. Finally, we will discuss KVA within the context of DoD/DoN transformation.

Chapter IV will be a conceptual and technical description of the pilot web-site we develop to demonstrate the applicability of BPR and KVA to the DoD Transformation efforts. This will include a technical description and overview of the web-site, screen shots and a description of how to use the site. We will also include a brief user's manual for the DoN BPR site. Since this is simply a prototype, the functionality will be limited and it is intended to be simply a demonstration of what is possible.

Chapter V will be the point of integration to show the applicability of the BPR web-site to BPR and transformation. This is intended to solidify the premise that transformation can be successfully supported by technology and can serve as a launching platform for responsible, effective transformation efforts.

Chapter VI will summarize our efforts, solidify conclusions and make recommendations about where future research can expand on these efforts.

H.   SUMMARY

The Department of the Navy is undergoing a transformational process that is intended to radically improve the business processes within the department. Each service, agency and command will be tasked with "thinking outside the box" to make substantial improvements in the efficiency and effectiveness of their functions.

This thesis will look at established practices within the government and industry to determine whether established practices for radical change can be successfully applied to the DoN. By applying a standard set of metrics and measurement tools and applying the KVA model, we believe that the transformation effort can achieve greater success with less disruption and churn in the long run.

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II.   BUSINESS PROCESS RE-ENGINEERING

A.   DEFINING BUSINESS PROCESS RE-ENGINEERING (BPR)

The concept of BPR as a strategy for creating change and improvement in organizations goes back to the 1980's when there was a concern that the investments in information technology were not producing the results that were desired. Since the 1960's business entities have poured billions of dollars into IT investments and had seen only marginal improvements in business performance and productivity (Strassman, 1997).

With the advent of the technology era there was a general feeling that the use of IT could provide a competitive advantage to an organization through the efficient and effective use of information. As the technology matured and the organizations learned how to use the "systems" in a more efficient manner, the output from those systems did not prove to be more useful. While in this definition of IT, we are speaking of those systems that benefit the knowledge worker or those who have traditionally been considered white collar. There is no disputing that the use of computers for process automation on the factory floor has produced tangible results (Strassman, 1997).

So what has been the hindrance in being able to recognize the true benefits of technology for knowledge workers? While there are many different opinions on what has caused the disconnect, there is a general consensus that the introduction of information technology into the business environment has been done in a way that has automated inefficient processes. The information technology has been a tool for making existing processes faster and more accurate. (Strassman, 1997)

When considering how a process fits into an organization and further how to introduce technology to make that process more efficient and/or effective, the overall goals of the process need to be considered. Is this process change intended to produce incremental improvements in the way the process is accomplished, or is it intended to completely change what is currently being done? The former, as espoused by the Total

Quality Leadership (TQL) champion, Dr. W. Edwards Deming is a process that leads to continual improvements over time. The latter is the concepts embodied in Business Process Re-Engineering.

1. The Tenets OF TQL

The philosophy of TQL was first championed by Dr. W. Edwards Deming in the 1950's. The crux of his ideas are based around his famous fourteen points which are designed to create a more efficient workplace, higher profits and increased productivity. These points, as stated in Dr. Deming's book "Out of the Crisis" are:

- Create and Communicate to all employees a statement of the aims and purposes of the company

- Adapt to the new philosophy of the day; industries and economics are always changing

- Build quality into a product throughout production

- End the practice of awarding business on the basis of price tag alone; instead try a long-term relationship based on established loyalty and trust

- Work to constantly improve quality and productivity.

- Institute on-the-job training

- Teach and institute leadership to improve all job functions

- Drive out fear; create trust

- Strive to reduce intradepartmental conflicts

- Eliminate exhortations for the work force; instead, focus on the system and morale

- (a) Eliminate work standard quotas for production. Substitute leadership methods for improvement. (b) Eliminate Management by Objectives (MBO). Avoid numerical goals. Alternatively, learn the capabilities of processes.

- Remove barriers that rob people of pride of workmanship

- Educate with self-improvement programs

- Include everyone in the company to accomplish the transformation

Dr. Deming's philosophies have been highly regarded throughout industry and are credited with the big turnaround of the Japanese Industrial Base after World War II. His philosophies, while initially ignored by the United States Industries, have since been adopted and adapted to help improve productivity and quality.

Expounding upon several of the points in Dr. Deming's philosophy, additional insight can be ascertained. The first point simply states the company must survive, compete and replenish itself through innovation and research. The fifth point is based upon a process of continual, incremental improvement that, over time, will make the organization grow and prosper. In general, Deming's fourteen points are geared towards incremental change, small steps that will make a big change over an undefined period of time.

B.   BUSINESS PROCESS RE-ENGINEERING (BPR)

Business Process Re-engineering (BPR) or Business Process Redesign as it is sometimes referred to in the popular press is "the analysis and design of workflows and processes within and between organizations" (Davenport and Short, 1990). Teng et al. (1994) further define BPR as "the critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures". While essentially, these two statements are compatible, there is a major difference between Davenport and Short's view and Teng's perspective.

Teng's research has concluded that the interest that has been generated in business process has been largely a by-product of the move towards increased quality in the workplace. Before quality was the buzzword, business process was generally defined by historical practices and the need to get the work completed. When increased quality was brought into the picture, many organizations needed to analyze the "why" behind the real or perceived lack of quality. Point number three of Deming's fourteen point program states that an organization must "Build quality into a product throughout production". While this might seem intuitive, historically it has not been the case. Many manufacturing organizations sponsored a quality inspection step that was there to ensure that the product met a basic level of functionality. If it met the standards, the viewpoint was that any hidden defects would be handled through the warranty process. From a manufacturing point-of-view, this was beneficial to the bottom-line. It kept costs down and made the price of the product more attractive in the marketplace. However, from a

corporate point-of-view, the results could be very different. Significant design, safety or manufacturing flaws might not show up until long after the product was in service. If the flaws were serious, the corporation was opened up to large warranty claims and litigation.

As a result of the push for improved quality, many manufacturing businesses noted that the way the manufacturing process was accomplished was the direct reason for the lack of quality product. In the TQL process, those procedures would be changed to remove the impediments to higher quality. One of the oftentimes unspoken limitations of TQL is the fact that it supports change over an open-ended period of time.

Davenport however recognized that there were limitations to TQL, most notably the emphasis on incremental change. In order to make a significant improvement, oftentimes the difference between survival and failure, there needs to be a more radical adjustment to the business process. He characterized the differences as provided in Figure 2:

	Improvement (TQL)	Innovation (BPR)
Level of Change	Incremental	Radical
Starting Point	Existing Process	Clean Slate
Frequency of Change	Continuous	One-Time
Time Required	Short	Long
Participation	Bottom-Up	Top-Down
Scope	Narrow/Functional	Broad/Cross-Functional
Risk	Moderate	High
Primary Enabler	Stat Control	Information Technology
Type of Change	Cultural	Cultural/Structural

Figure 1: Process Improvement (TQM) vs. Business
Process Re-Engineering (BPR) (Davenport, 1993)

Figure 2.   Process Improvement (TQM) vs. Business Process Re-Engineering (BPR)
(From: Davenport, 1993)

1.   Business Process

In order to clearly define and understand how to re-engineer a business process, it is important to understand what the term business process really means. Davenport and

Short (1990) define a business process as a "set of logically related tasks performed to achieve a defined business outcome." El Sawy (2001) further defines the concept of business process (in the context of BPR) by breaking down the term into its two components. He states that "The B in BPR defines the boundaries of a process in a way that makes sense in terms of business value: the coordination of ensembles of tasks performed by many people rather than narrow tasks performed by one person." He further defines the Pin BPR as "a primary focus on essential processes that deliver outcomes in the signature of all variants of BPR rather than focus on static organizational structures."

While Davenport and El Sawy have chosen different ways to express the concept of Business Process, what is clear is that it must have boundaries, relationships and create an output. While much of BPR has focused on the manufacturing process, it does not only support the creation of physical goods.

A business process can be defined as the manufacture of goods within the traditional factory setting. It can also refer to the relationships and interactions that take place in the service economy. A business process can be something as commonplace as the way a customer purchases an airline ticket or picks-up a rental car to something as complex and dynamic as the financial relationships within the international banking system.

The term "process" in BPR also has some specific connotations. Processes may be simple one or two step methods for accomplishing a task or may have hundreds of individual sub-processes that each requires several steps. For the purposes of BPR, we define processes as having a starting and ending point, interfaces between prior and after processes, organizational units with both a process owner and a customer. A customer may be internal to the organization, such as the next process owner or they may be external, such as a product or service consumer. An example of an internal customer might be the final assembly line of an auto plant that receives a component to install on the car or truck. The assembly of the component has a process that may include other components, information, people and testing/verification. The customer to the component process is the final assembly line which needs the right components,

delivered in a timely manner that meets the quality requirements of the final product. The customer to the final assembly line is the dealer network and ultimately the buyer who will purchase the vehicle.

While the processes for manufacturing, supply chain management or checking into a hotel are very different, they all have three dimensions that must be considered (Davenport and Short, 1990):

- Entities: Processes take place between organizational entities. This includes Interorganizational, interfunctional and interpersonal.

- Objects: Processes result in the manipulation of objects. These objects may be physical or informational.

- Activities: Processes can involve two types of activities: Managerial and/or operational.

2. Re-Engineering

The definition of re-engineering continues to go through changes and adjustments as the concept matures. However, there are several key points, as summarized by Figure 2, which are the underlying structure for this procedure. El Sawy (2001) summarizes them as follows:

- Re-Engineering searches for quantum improvements rather than incremental ones.

- Re-Engineering efforts will use Information Technology to enable the process to be done in ways that are qualitatively different.

- Re-Engineering efforts focus on maximizing the value-adding content of a process and minimizing everything else.

- Re-Engineering will create value that can have many different forms and can be measured through surrogate performance measures.

- Re-Engineering will affect the work environment (people skills, organizational design, and organizational structure) which will have to be concurrently changed to fit the re-engineered process.

While the conceptual success of BPR is certainly viable, there are a number of questions that need to be considered. There are a number of common myths about BPR that must be addressed. Davenport and Stoddard (1994) identify six that are prevalent:

- Re-Engineering Novelty: while re-engineering employs familiar concepts, these concepts are combined in a new synthesis. The key components have never been together before.

- The Clean Slate: A "blank sheet of paper" for design usually requires a "blank check" for implementation. Although re-engineering can deliver radical designs, it does not promise a revolutionary approach to change.

- IS Leadership: IS should serve as a partner in a cross-functional team that is generally headed by a non-IS project leader and a non-IS business sponsor.

- Re-Engineering vs. Quality: Re-engineering projects are usually only one in a portfolio of approaches to organizational change. Other includes continuous improvement, incremental approaches and restructuring techniques.

- Top-Down Design: While the emphasis of BPR may come from the top, the implementation and execution of the redesigned processes depend upon those who do the work.

- Re-Engineering vs. Transformation: BPR contributes to organizational transformation but it is not synonymous with transformation.

C. BPR AND INFORMATION TECHNOLOGY

Business Process Re-engineering alone is not enough for most organizations to achieve the profound and transformative effects that are desired. BPR must be supported by enablers, a key one being information technology (IT). In the capacity as an enabler, IT may be viewed as more than a tool for automating a process; it may be viewed as a force that can create a fundamental change in the way that business is done. (Davenport and Short, 1990)

In the current environment there are many different technologies that vie for the attention of the business manager. From networking and connectivity technologies to productivity and work enhancement technologies to simple automation technologies, the gamut of choices is enormous. However, one fundamental underlying concept that is critical for a BPR initiative to succeed, is that the technology and the processes must work together. While this sounds simple enough, it often becomes the Achilles heel of BPR initiatives. (Davenport and Short, 1990)

Harold J. Leavitt developed the Leavitt Diamond (Figure 3) to demonstrate the relationships between four key functions of a BPR initiative. By managing the variables of Information technology, Organizational form, People Skills and Business Processes

can an organization reach a balance that is necessary for success. This balancing act is difficult to achieve, because any one of the four functions does not give warning signs that it may be out of balance.

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                    ┌──────────────────┐
                    │   Information    │
                ↗   │  Technology Use  │   ↖
                    └──────────────────┘
       ┌──────────────┐      ↕      ┌──────────────┐
       │   Business   │  ←──────→   │ Organizational│
       │   Processes  │             │     Form     │
       └──────────────┘      ↕      └──────────────┘
                ↘   ┌──────────────────┐   ↙
                    │    Requisite     │
                    │     People       │
                    │     Skills       │
                    └──────────────────┘
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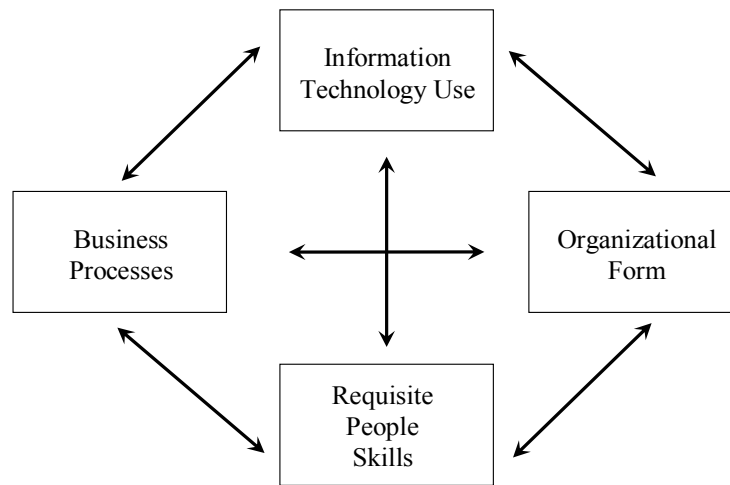
Figure 3.   The Leavitt Diamond

In recent years there have been huge levels of investment in information technology, within both the private and public sectors, which has not produced the expected results. By carefully applying the concepts of the Leavitt Diamond, it may be possible to answer the questions about which one(s) of the other functions have not been changed enough to match the investment in technology.

The degree to which IT enablement has been adopted by business has grown at a staggering rate. The manner in which that IT is used to enable business processes has changed as the technology has changed. While not all sectors of the economy have moved at the same rate, or changed in the same manner, most recognize that IT is the principal enabler to ensure longevity and success. El Sawy (2001) demonstrates the degree to which IT enablement has supported BPR initiatives (Figure 4):

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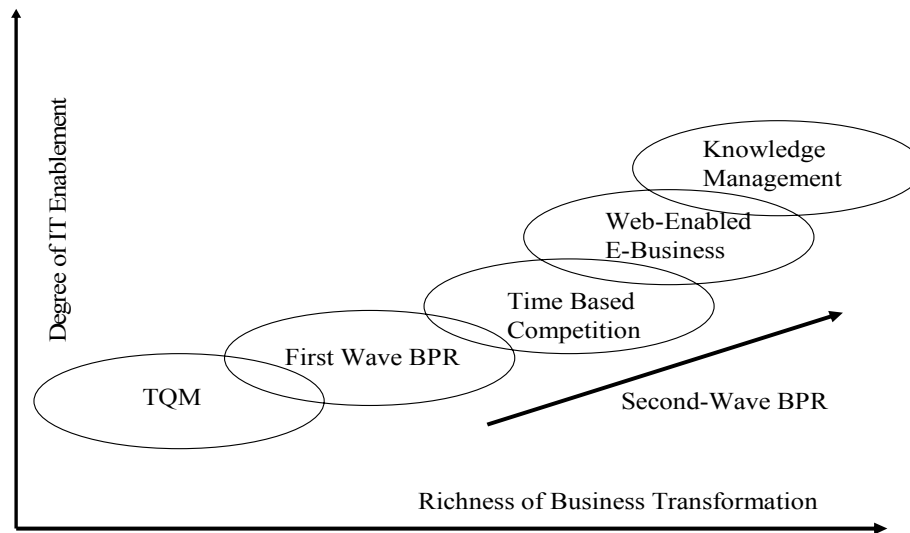
Figure 4.   Waves of Business Process Improvement (From: El Sawy, 2001)

1.   Web-Enabled E-Business

The state of the industry with regards to BPR has advanced into second-wave BPR and is in the midst of the Web-Enabled E-business process. In that regards, web-enabled is a common industry term that generally refers to a procedure, process and/or application that is delivered via a network, local, wide-area or Internet, and is accessible via a web-browser on the desktop computer. (El Sawy, 2001) The benefit of this methodology for delivery is the ease of use, consistency between applications and the ability to access the application from virtually anywhere. Certainly, there are web-enabled applications that have variations on these characteristics, but a majority meet these criteria.

When the concept of BPR is added to the enabling technologies of the web, there are many different ways to make radical change. El Sawy (2001) provides a definition that demonstrates the unique characteristics of BPR with E-business: "BPR for e-business involves rethinking and redesigning business processes at both the enterprise and supply chain level to take advantage of Internet connectivity and new ways of creating value."

While the distinction is subtle, it is very important to differentiate between e-business and e-commerce. In general, e-business refers to all of the functions that go into the way that an organization operates, how its processes are structured and how it maintains relationships between all members of the value chain. E-commerce is a subset of e-business and is generally the manner in which an individual transaction is accomplished. One other term that is commonly used when referring to the public sector is e-government. E-government is the manner in which a government entity interacts, using web-enabled technology, with other government entities, businesses, citizens and employees. E-government, like e-business involves more than just commerce.

2. BPR With E-Business and the Value Chain

Web-enabling a business entity using the concepts associated with BPR can lead to changes that reach far beyond the enterprise. Most organizations are part of a value chain which means that they have relationships that stretch backwards towards suppliers and forwards towards customers. Whether the business that is looking at BPR fits exactly into this model depends upon the mission and structure of that entity.

When discussing BPR in this context, it is necessary to recognize that a value chain is not the same thing as a supply chain. In fact, a supply chain is a subset of the overall value chain. The best way to view this concept is in terms of an example.

The business that is looking at BPR is a manufacturer of both finished products and assemblies that are sent to other manufacturers for final assembly. As described by Fingar (2001) the traditional value chain is linear as demonstrated in the top graphic of Figure 4. The manufacturer itself is composed of numerous departments that interact in order to fill the needs of the manufacturing function. Each of these is a separate entity with structured processes internal to the organization. The function that is responsible for the raw materials (parts, materials, labor etc) interfaces with only those organizations responsible for providing the right items at the right time. Ostensibly, there is no direct interaction between seemingly non-related functions. Those functions that provide finished product to the customer (either complete products or assemblies) only interface with their customers. This is the traditional way in which business was transacted.

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As the middle graphic of Figure 5 demonstrates, with the advent of information technology in the traditional client-server mode, the internal functions of each organization were better able to communicate, but the linear value chain remained in tact. This is the point where many businesses and government entities are today. The enterprise has been "wired" and there is sharing of information between functions such as finance, manufacturing, inventory, billing and customer service. This is an example of an organization that has achieved first wave BPR.

SUPPLY CHAIN **DEMAND CHAIN**

SUPPLIERS' SUPPLIERS   SUPPLIERS   MANUFACTURER   CUSTOMERS   CUSTOMERS' CUSTOMERS

TRADITIONAL INDUSTRY VALUE CHAIN

SUPPLY **DEMAND**

SUPPLIERS' SUPPLIERS   SUPPLIERS   MANUFACTURER   CUSTOMERS   CUSTOMERS' CUSTOMERS

VALUE CHAIN WITH CLIENT-SERVER TECHNOLOGY

TRADING PARTNERS' E-SERVICES

WEB-SERVICES PIPES

SUPPLY **DEMAND**

SUPPLIERS' SUPPLIERS   SUPPLIERS   MANUFACTURER   CUSTOMERS   CUSTOMERS' CUSTOMERS

VALUE CHAIN WITH E-BUSINESS

Figure 5.   Changing Value Chain

The lower graphic of Figure 5 shows the beginnings of BPR through the use of e-business technologies. Fingar argues that while the value chain is still linear, the lines of communication and collaboration between functions both forwards and backwards in the value chain are evident. The introduction of technology has allowed the all parties from

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suppliers to customers to communicate and share information. While this is not technically re-engineering, it is a paradigm shift from the traditional way of conducting business. Some of the benefits of e-business technologies can be recognized, but they are stifled by the old linear model.

The benefits of BPR can be realized through the use of e-business technologies much better as shown in Figure 6 (Fingar, 2001). The individual clouds represent the traditional suppliers, manufacturers and customers as well as the trading partners, e-services and e-marketplaces. As a business entity transforms from a traditional organization to an enabler of business, it may take on new partners and shed traditional ones.
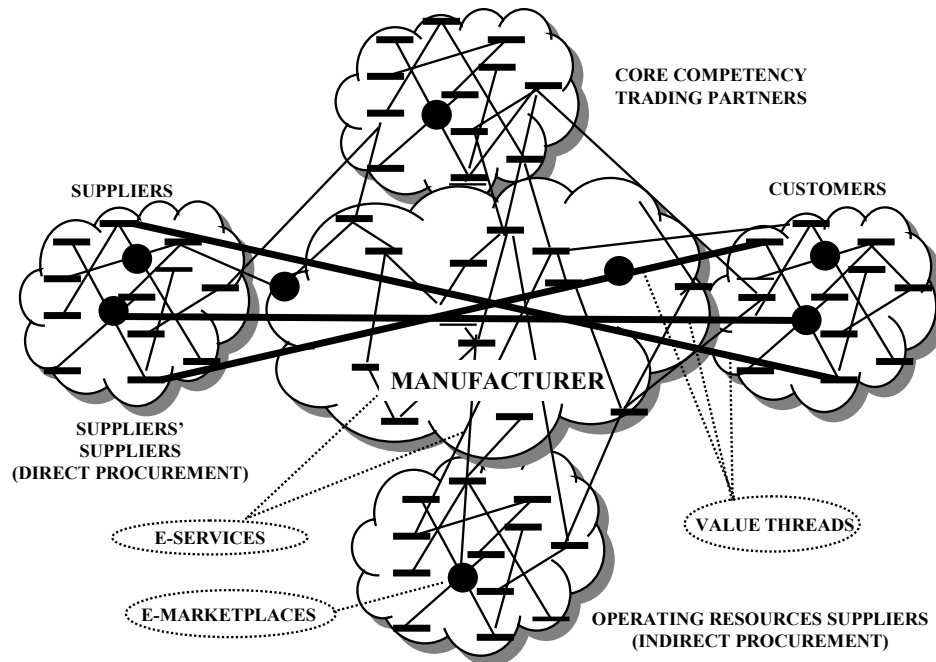
Figure 6.   BPR E-Business Environment

Again, looking at our manufacturer of finished goods and assemblies we can see that the role of a department or function in the manufacturing business may now be done by an external provider. Shipping and receiving, payroll, inventory management, customer service and billing are functions that are now being outsourced to national

providers. This does not indicate that these functions are any less important, it simply means that they may be done better and cheaper by someone else. The consequences of this outsourcing relationship are that the contracting organization must be able to see and do everything that they could before, plus some. In order to achieve this, internal practices of one organization must be brought into line with the practices of another. These changes also have consequences, which will ripple throughout the organization and value chain. If an organizations shipping and receiving practices change due to an outsourcing relationship, then they will need to change relationships with suppliers and customers so that they will meet the new requirements. That in turn may change the way the contractor does business not only with one company, but with their other customers as well. If this change is re-engineered to better meet the needs and lower the costs to all, then the effort could be declared a success.

However, piecemeal re-engineering can have its drawbacks as well. (Fingar, 2001) One organization that makes changes that impact others, may raise the costs or lower the revenue of partners. Therefore, the changes that take place must be carefully planned with all concerned. The ability to change a linear value chain to the web-like model is an example of a value chain transformation accomplished through BPR with the application of e-business technologies.

D.   BPR AND DOD TRANSFORMATION

The United States Department of Defense is in the midst of a revolution; one that is intended to transform the current military structure and capabilities from the 20th to the 21st century. According to President George W. Bush transformation will provide *"...a future force that is defined less by size and more by mobility and swiftness, one that is easier to deploy and sustain, one that relies more heavily on stealth, precision weaponry and information technologies."* (TPG, 2003)

In the DoD Transformation Planning Guidance, transformation is defined as "a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain out strategic position, which helps underpin peace and stability in the world."

While a very thorough explanation of what a transformation effort is intended to achieve in the DoD, this definition fails to really address the underlying concepts of transformation itself. One of the most complete definitions of transformation as a concept comes from Business Process Redesign: An Overview by Yogesh Malhotra who quoted "Organizational transformation is profound, fundamental changes in thought and actions, which create an irreversible discontinuity in the experience of a system."

Transformation can be viewed as the new beliefs which lead to a change in the culture of the organization. The transformation of one function may have implications far beyond the function that is directly changed which may lead to a need for changes in the organizational structure, strategy and business capabilities. (Malhotra, 1998)

From the perspective of the Navy, several transformations of the past are the move from sail to steam, from wooden hull to steel and from battleships to aircraft carriers. As a result of these changes in ship form and function, there were also changes to the way that ships were outfitted, manned and operated. The changes that took place when ships moved from sail to steam were profound and far-reaching. No longer were tactics reliant upon wind but instead upon replenishment of fuel. Ships no longer were deployed as single units, but instead as part of a larger battlegroup. As time passed and tactics were refined, the Navy became a much greater part of the overall military forces of the United States.

1. Re-Engineering vs. Transformation

Based upon the definitions and goals of transformation, it is necessary to ask "is re-engineering synonymous with transformation?" The answer is re-engineering is a process that contributes to transformation, but it is not synonymous with transformation. It is a subset of an overall transformation effort that can contribute to the success of that effort. (Malhotra, 1998) Re-engineering, particularly re-engineering using information technology, is one of the enablers for a transformational endeavor. This idea was put for by M. Hammer in his 1990 article "Reengineering Work: Don't automate, Obliterate." Hammer states that "at the heart of reengineering is the notion of discontinuous thinking, or recognizing and breaking away from the outdated rules and fundamental assumptions underlying operations". He further states that the following principles will contribute to

the success of a reengineering effort: (a) Organize around outcomes, not tasks; (b) Have those who use the output of the process perform the process; (c) Subsume information processing work into the real work that produces the information; (d) Treat geographically dispersed resources as though they were centralized; (e) Link parallel activities instead of integrating their results; (f) Put the decision point where the work is performed and build control into the process; and (g) Capture information once and at the source.

If transformation is the ultimate goal, then reengineering with Information Technology is one of the tactical actions necessary to achieve that goal. The role that IT plays in the reengineering of business processes is that of a powerful tool to reduce the cost of coordination. (Davenport and Short, 1990) Teng et al. (1994) expounds on the role of coordination by stating that innovative uses of IT would inevitably lead many firms to develop new, coordination-intensive structures, enabling them to coordinate their activities in ways that were not possible before. Such coordination-intensive structures may raise the organization's capabilities and responsiveness, leading to potential strategic advantages.

2. Transformation and the Department of Defense

Secretary of Defense Donald Rumsfeld is leading the charge for the transformation of the Department of Defense (DoD) from its current state to one that is faster, more mobile, easier to deploy, more effective and costs less. In April 2003, he laid out the guidance for the DoD on the strategies and goals of transformation. He defined the strategic imperative as being necessary to ensure that U.S. forces continue to operate from a position of overwhelming military advantage in support of strategic objectives. The five reasons that a transformation effort is necessary for the defense strategy are as follows: (TPG, 2003)

- Difficulty with the Status Quo: Even though the U.S. currently has the largest and most powerful military in the world, the world is continually changing. As the education, wealth and access to information continue to grow throughout the world, the relative strength of the U.S. military advantages diminish.

- Growing Asymmetric Threats: The current military structure of the U.S. was designed to confront another well equipped and trained military force. With the collapse of the Soviet Union, small states and terrorist organizations have taken on new powers and have brought forth new threats. A single person or small group of people can inflict large scale damage to the U.S. as evidenced by the attacks of September 11, 2001. The current force structure of the U.S. is not equipped and trained to take on such threats.

- Rising force-on-force Challenges: As the world has changed, there might be the perception that the U.S. has become complacent without a major power to confront. Changes to the technologies and access to information in the world, particularly through the Internet, has given previously unsophisticated adversaries almost equal access to capabilities. Additionally, with the increasing reliance upon networks, seemingly small actions by an adversary can have large and devastating economic effects on the U.S. economy. One example, and not one created by an adversary, is the recent electrical blackout in the Eastern United States and Canada in August 2003. Just one day of no electricity to a handful of major cities cost the economy untold billions of dollars.

- Historic Opportunity: The United States and the world are currently in a major transition from an industrial economy to an information economy. During this transition, the military has an opportunity to drive the manner in which the information economy will support the forces of the future. By taking the leap forward, and transforming the U.S. forces from industrial age thinking to information age processes the DoD can continue to maintain it pre-eminence in the world.   The same way it took adversaries longer to adapt to the changes of the past, the strategy is to get a large head start over current adversaries. But we must never forget, advantages are fleeting, thus our enemies will also find ways to adapt, often by exploiting the weaknesses in our own new strategies.

- High Stakes: Time waits for no man or no nation. With the demise of a bi-polar world with two great nations poised to decimate each other, there is a perception that the opportunity for smaller, regional forces to emerge has come about. The U.S., with its current force structure, is not equipped or structured to take on many dispersed conflicts.   With our current emphasis on southwest Asia (Afghanistan and Iraq), the ability for another large scale conflict is limited. The ability for the U.S. to increase its force structure to a scale that would allow us to take-on the world is limited. Therefore, the timing is imperative that we take another look at how we are structured and what we can do better to defend ourselves and out allies. Now is the time for a transformation.

3.   DoD Transformation Scope

The Department of Defense is a huge organization that employs over two million people.   With a fiscal year 2003 budget of $375 Billion dollars (Reference) and a structure that is relatively de-centralized, the size of the potential changes are enormous.

In order to begin the process of "taking bites from this elephant", Secretary Rumsfeld has defined three areas of focus in the transformation effort. (TPG, 2003)

- How we fight: This portion of the concept is concerned with the approach to the transformation of the fighting forces.   One key factor in this approach will be the development of a joint warfighting concept that includes: doctrine, organization, training, material, leadership and education, personnel and facilities.

- How we do business: The way we do business can be transformed in terms of adaptive planning, a future oriented capabilities based resource allocation planning process, accelerated acquisition cycles, spiral development of systems and capabilities, output-based management and a reformed analytic support agenda. The manner in which DoD conducts its business operations is the area that can be most closely aligned with the private sector.   The process that DoD uses for defining requirements, obtaining fiscal authority, building and buying weapons systems and supporting materials, developing and integrating information systems and hiring and retaining personnel are effective but slow and cumbersome. Not all of the fault lies within DoD, for many of the processes are incorporated into public law.

- How we work with others: Transformation of how we work with others includes new agreements and cooperation between DoD and other federal departments and agencies, state and local governments as well as industries that have a major stake in the protection of our critical infrastructure.   These functions may include the electrical power grid, telecommunications grid, dams and waterways as well as ports of entry. Again, the impact of September 11th has changed the way that the U.S. looks at security.   With the threat of asymmetric conflict, the DoD is looking to transform how the department works with outside activities that have not been traditional partners. Moving beyond the concepts of joint warfighting by the services, this includes new and enhanced partnerships for both regional and national security. Traditionally the DoD has worked in security agreements with the forces of allied nations, but has not worked with departments and agencies within our own country.

4.   DoD Transformation Strategy

The Department of Defense has taken a three part approach to the implementation of a transformation strategy. (TPG, 2003)

- Transformed Culture through Innovative Leadership: The transformation of an engrained culture is one of the most difficult and critical steps towards changing the way in which DoD operates. Innovation, one of the underlying factors in this part of the strategy is also one of the most critical aspects for the overall transformation strategy. Historically DoD has not been an organization that valued innovation as a hallmark for career success. Innovators often fail in an organization that places greater value on the execution of current plans. This part of the strategy will require leadership, at all levels, a changed rewards structure and the elimination of those impediments that do not reward innovation. Part of this strategy will require changes to policies and regulations that all members of the DoD must follow.

- Transformed Processes – Risk Adjudication Using Future Operating Concepts: Simply put, transformation today will require that some current programs and initiatives will have to be stopped or curtailed in order to build the forces of the future. This part of transformation has two parts:

  - Reformed Capabilities-Identification Process: Redefining the process and procedures by which we identify and capitalize concepts, capabilities and options for the future.

  - Transformed Strategic Analysis: The procedure by which threats and capabilities are assessed to determine the risk of action or inaction must be transformed. Rather than creating capabilities that are intended to support any contingency, the analysis must take into account the uncertainty and risk associated with threats and capabilities. This is not a static process, for the changes in the technical environment dictate that the analysis must be an on-going process.

- Transformed Capabilities through Force Transformation: Whenever a transformation effort is undertaken, there are numerous factors at work that make the process difficult and risky. The first is the balance that must be maintained between current and future investments and operations. With ongoing commitments for resources to support current operations, both the people and funds are limited for the development of future concepts. While nobody is suggesting that current needs are less important, they must be balanced with the risks of not creating a future capability. An analogy could be made to the Manhattan Project during World War II which produced the first atomic bombs. The U.S. was actively engaged in a two-front war that was taking considerable resources to support. But, without the additional effort to create a bomb, which was unprecedented for its time, the war may have lasted longer and taken more lives. This was a balancing act, that proved successful and forever transformed the manner in which warfare and strategic deterrence would be handled. The second issue is the decision to develop and invest in technologies that are considered transformational today, while remaining

open to other paths in the future. In terms of Information Technology this is a particularly difficult problem. With the rapid and ever-changing face of IT, it is easy to get trapped into a technology that is not the best for future changes.

5.   DoD Transformation Initiatives

In July, 2001, Secretary of Defense Donald Rumsfeld issued a memorandum to the leadership of the department concerning an initiative to transform the DoD financial management information processes. In the memo, he stated that "Currently, the Department's financial and nonfinancial operations and systems do not work effectively together to produce the most desirable financial management information."

The initiative was called the Financial Management Modernization Program (FMMP) and was the Secretary's first initiative in the transformation efforts. The management of the program was placed with the leadership of the Under Secretary of Defense (Comptroller). The directives to the Comptroller were to "Develop a DoD-wide blueprint—an Enterprise Architecture that is consistent with the Department of Defense Chief Information Officer's Information Technology architecture—that prescribes how the Department's financial and nonfinancial feeder systems and business processes will interact."

The FMMP was expanded by the Under Secretary of Defense (Comptroller) in May, 2003 to include not only DoD financial management systems, but all business systems. The program was renamed the Business Management Modernization Program (BMMP) with the program management responsibilities remaining with the DoD Comptroller.

In April 2003, the Comptroller presented a briefing to the DoD leadership outlining the roles and goals of the BMMP. Key components of this briefing are as follows:

- BMMP Program Charter
    - Transform and Modernize business processes across DoD
    - Standardize and Integrate processes enabled by technology and systems

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- Capitalize on DoD strengths and infuse leading practices into DoD operations

- BMMP Approach

  - Development of an enterprise architecture…create a "blueprint for building and connecting new and existing processes and systems

  - Develop end-to-end business scenarios to provide business process validation

  - Develop a transition plan to lay out key high-level tasks

  - Group business rules and requirements by business area or domain

  - Domain leaders will lead the transformation efforts of BMMP

- Seven Domains of BMMP

  - Logistics

  - Acquisition/Procurement

  - Installations and environment

  - Human Resources Management

  - Finance, Accounting, Operations and Financial Management

  - Strategic Planning and Budgeting

  - Technical Infrastructure

- How BMMP will be different from past initiatives

  - Unprecedented support from the highest levels in DoD

  - One, integrated, technical architecture

  - Full range of business functions addressed

  - New technologies available today

  - Incremental rollout of the architecture

  - Greater attention to involving critical stakeholders

  - Governance structure establishes ownership by key executives

Currently the BMMP is in the early stages of development and implementation. The plan for the rollout of the entire BMMP will be a long-term, ongoing process. Figure 7 shows the current timeline for the transformation effort as stated by the DoD Comptroller in his April 30, 2003 briefing.
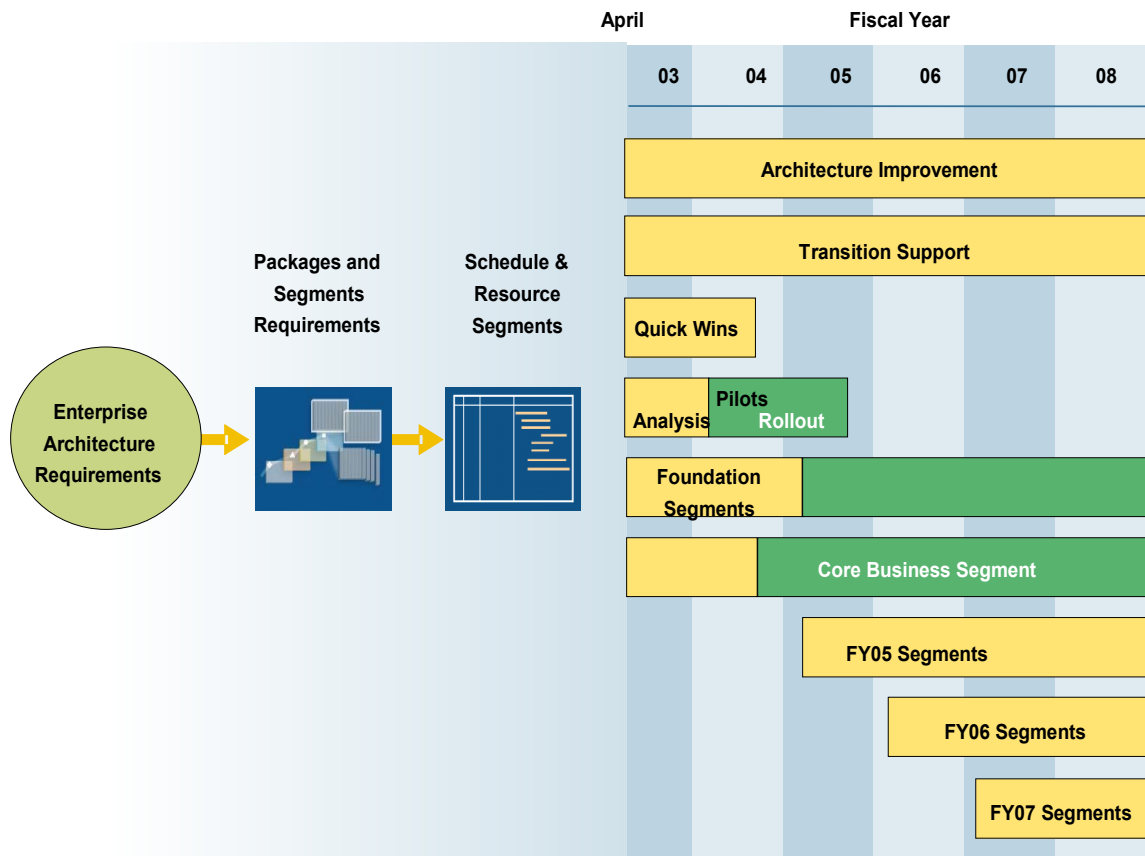
Figure 7.   FTimeline for BMMP Initiative

E.   SUMMARY

Business Process Re-engineering, the process of radical change, can be a key component of the underpinnings of transformation of the DoD In order to achieve the goals that the Secretary has laid out, it is imperative that the transformation effort has a clearly defined methodology for how transformation is to be measured. With many different organizations spread throughout the world, the DOD needs to be able to judge whether the changes that are taking place, are actually moving towards a common goal. The Transformation Planning Guidance and the current BMMP initiative are significant milestones for the DoD and the efforts of reengineering and transformation.

Chapter III introduces the concept of Knowledge Value Added (KVA) as a methodology for measuring the results of the individual transformation efforts.

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III. KNOWLEDGE VALUE ADDED (KVA)

A. KNOWLEDGE MANAGEMENT

In the ever-changing world of business and governmental activities there is a continual issue regarding the employment of information systems and their "value" to the enterprise. While few people would argue that information technology has not had a major impact on the business community, many would argue whether that impact has been positive or negative.

Economist Paul Strassmen has stated that there is no relationship whatsoever between computer expenditures and company performance. John Seely Brown, director of Xerox Parc observed that despite investment of over one trillion in technology over two decades of this era, U.S. industry had realized little improvement in the efficiency and effectiveness of its knowledge workers. But what is a knowledge worker and how does knowledge differ from information?

1. Knowledge vs. Information

While many have defined these two terms with respect to a hierarchy, in this thesis we will express the difference in a slightly different manner. While the semantics of both terms can be argued, the pragmatic view of each is in the manner in which it is employed.

Information is a collection of data, that when aggregated and placed into context, action can be taken. This contrasts with knowledge, which can be interpreted in terms of its potential for action and distinguished from information in terms of its more immediate link with performance. In laymen's terms, Information affects immediate performance and knowledge is more valuable from a long term perspective. (Malhotra, 2000)

The employment of these definitions can be seen in terms of the experience level of employees in an organization. Information systems produce output that can be seen by anybody with the appropriate access. So why can the same information be interpreted differently by different people? Based upon Malhotra's definitions, the person with the

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most knowledge interprets the information and applies experience and knowledge to determine what the information actually means. This is where the real value of information resides.

While the creation of information is simply the accumulation of data manipulated with business rules, a role that computers do exceptionally well, human beings take the central role in the creation of knowledge. Computer generated information has limited ability to carry the interpretation for potential action. Knowledge is subjective, and action is based upon subjective interpretation.

2.   Knowledge and Transformation

Based upon Chapter II and the discussion of transformation, the value that can be extracted from transformation should be based upon knowledge not information. By accepting that knowledge is the potential for action and information is current action, then if a transformation effort is to succeed, then it must be fueled by knowledge.

The vision of the Secretary of Defense for the DoD transformation efforts are based upon a desire to remake the capabilities of the department into the force that can fight the wars of the future more effectively and efficiently. In the Transformation Planning Guidance document the focus on the future of DoD is the thrust of the efforts of transformation. While there is always a need to continue with the current operations, and learn from the successes and failures of today, the idea of transformation is to create the future. Therefore, we assert that the DoD of the future must be fueled more by knowledge rather than information.

B.   MEASUREMENTS TO ENSURE SUCCESS

In order to determine whether transformation efforts are successful there must be a methodology for the measurement of those efforts. Without the ability to measure, in some meaningful way, the results of transformation cannot be determined.

Throughout the history of business there have been numerous methodologies that have been applied to determine how function or investment is performing.

1. Discounted Cash Flow (DCF)

The discounted cash flow method of valuing an investment or process is based upon the time value of money. In essence, it looks at the present value of a stream of funds in the future, in terms of its value today. An interest rate or discount rate is applied to the process so that the opportunity costs of the future are taken into account.

Discounted cash flow is a commonly used methodology for the valuation of a stream of costs or benefits that will take place in the future. It is a sound accounting principal, but has its limitations with regards to decision making.

One of the primary limitations of the DCF is the assumption of what discount rate will apply to costs or benefits in the future. Investments may cover many years, so the applied rate beyond one year is speculative. Another limitation of this method is the fact that it generally only value capital investments. If an organization were trying to determine what the value of a process is within the context of the organization, DCF methodology would not be the most effective choice.

2. Activity Based Costing (ABC)

Activity based costing is a process by which the true cost of a unit of output is determined. Within the context of an organization that produces products and services, there are multiple costs that go into the delivery of output. While most organizations have a handle on the direct costs that relate to output, the indirect costs must also be taken into account.

The reason for the application of ABC is to determine which products or services are money makers or losers, determine the break-even point and to compare different options for production. Once the true cost is known, the implications are for cost reduction, modification of business plans and strategic decision making.

ABC has been successfully used in industry in cases where there is high overhead, products are diverse and complex, the cost of errors is high and where competition is stiff. Without proper cost accounting, it is possible to "sell your way to bankruptcy". If the price for an item is not truly reflective of the total cost, greater volume leads to greater loss.

ABC, while an important concept, has great limitations. This process only takes into account the costs for a product. When a firm produces products and services that are to be sold, then ABC has value. When the output of a process is internal to an organization, ABD does nothing but highlight cost centers without identifying value. High cost, does not equate to waste or inefficiency. ABC does not identify where the value of a process is centered, so its use is limited.

3.   Balanced Scorecard

The balanced scorecard concept was developed by Dr. Robert Kaplan and David Norton in the early 1990's. They describe the concept as follows: "The balanced scorecard retains traditional financial measures. But financial measures tell the story of past events, an adequate story for industrial age companies for which investments in long-term capabilities and customer relationships were not critical for success. These financial measures are inadequate, however, for guiding and evaluating the journey that information age companies must make to create future value through investment in customers, suppliers, employees, processes, technology, and innovation."

While traditional valuation methods only looked at investments or processes from a financial perspective, the Balanced Scorecard took a four perspective approach. Figure 8 shows the realtionships between the four perspectives listed below:

- Financial: Kaplan and Norton do not disregard the traditional need for financial data.

- Internal Business Processes: Metrics based on this perspective allow the managers to know how well their business is running, and whether its products and services conform to mission requirements.

- Learning and Growth: This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement. In a knowledge-worker organization, *people* -- the only repository of knowledge -- are the main resource.

- Customer: The importance of the customer and customer satisfaction in any business is critical to success and longevity. Poor performance from this perspective is thus a leading indicator of future decline, even though the current financial picture may look good.

Like the other metholologies listed, the balanced scorecard has its value, but it also has its limitations. It takes into account the view that there is more to managing an

organization than the bottom line. It takes a big step towards looking at the organization as a whole. However, in that vain it often goes too far. The balanced scorcard, while in concept is straightforward, it is very difficult in reality to implement. In order to get you hands around all of the factors that need to be taken into account with the balanced scorecard, it is necessary to accomplish a full process analysis of the organization.
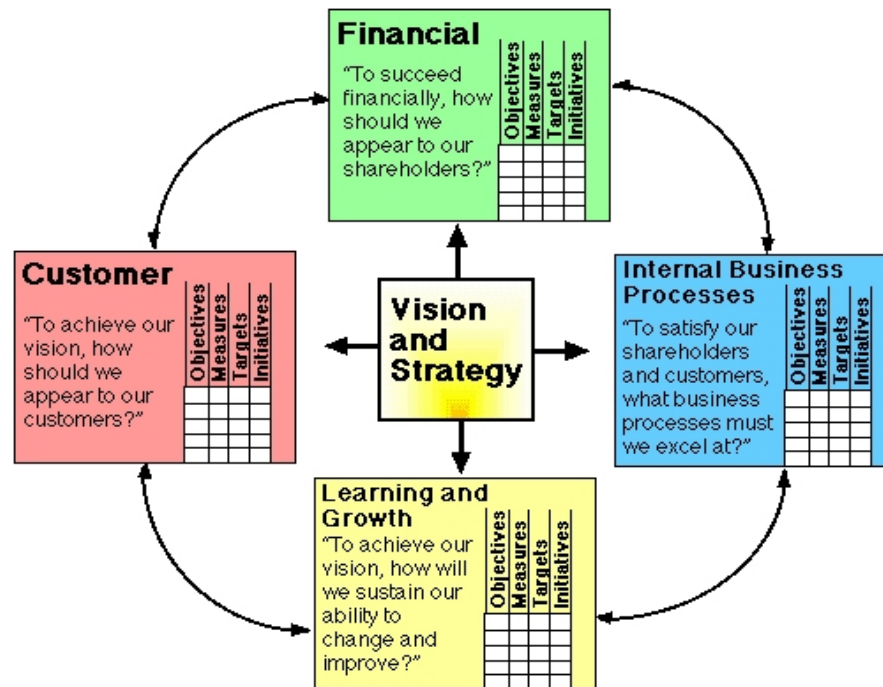
Figure 8.   The Four Perspectives of Balanced Scorecard (From: Kaplan and Norton)

4.   Knowledge Value Added

The fourth methodology for the valuation of process is relatively new and not as well-known throughout industry. Instead of using a process for determining return on investment, Knowledge Value Added (KVA) describes a theory and methodology for estimating return on knowledge. The primary difference between KVA and other methodologies is that KVA uses knowledge in people and systems as a way to describe process output in common units of measure. The common unit does not have to be the same for every process and does not have to be reflected only in terms of money.

Return on Knowledge (ROK) can be determined by:

- Measuring the amount of knowledge, when applied to a process, produces the outputs of that process. The output may be a product, or a service.

- Measuring the cost of acquiring the knowledge and applying it to produce the output. The major difference between this measurement and traditional methodologies is that KVA is concerned with the cost of acquiring and applying knowledge, not just with the costs associated with what is used to produce a product or service.

By applying the KVA methodology to a process you can determine the relationship of knowledge to value across an entire enterprise. KVA produces a common unit of knowledge that serves as a surrogate for units of output in a standard way. (Housel and Bell, 2001)

The benefit of the KVA methodology is that the output of a manufacturing process (goods) and the outputs of a service producing function can be compared to determine which one produces greater value. Historically, there have been many functions within an organization that while intuitively add value, there has never been a way to determine actual or relative value.

The measurement of the application of knowledge with an organization is a new and novel approach. Returning to the previous definition of knowledge being the "potential for action", it makes sense to apply a methodology for transformation that works to maximize the potential actions for the future within an uncertain environment. Using the measurements that show what is the current value of action, is an indicator, but not a predictor of future results.

C.   KNOWLEDGE VALUE ADDED

In their book "Measuring and Managing Knowledge", Dr. Thomas J. Housel and Dr. Arthur H. Bell defined the concept and outlined the procedures for the use of the KVA methodology. In order to understand the overall concept of KVA it is imperative to understand and accept the underlying assumptions that are the foundation of the process. Figure 9 outlines these assumptions

- In any process there is an input, a process that changes the input and an output

- If the Output equals the input, then the process added no value

- The "change" that takes place in the process is what creates value

- Change and value are proportional. The amount of value created as output is relative to the amount of change that takes place.

- Change can be measured by the amount of knowledge that it take to produce the change

- Therefore, Value and knowledge applied to make change are related

By accepting these assumptions, the KVA methodology can be used as a way to show that that knowledge and change are proportional and can be used as surrogates for value when the value that is created by a process. From an organizational perspective this can be of great value because the measurement and application of knowledge produces a standard unit of output, thus allowing different processes to be evaluated on a level playing field.

Another benefit that KVA produces is a ration of output over input. In traditional ways of valuing processes, the cost that goes into a process has been a primary factor.

Model: Change, Knowledge, and Value are Proportionate

Input   Process   Output

X $\longrightarrow$ P $\longrightarrow$ Y

$P(X)=Y$

Fundamental assumptions:
1. If X=Y, no value has been added.
2. "Value" is proportional to "Change"
3. "Change" can be measured by the amount of knowledge required to make the change.

So "value" is proportional to "change" is proportional to "the amount of knowledge required to make the change"
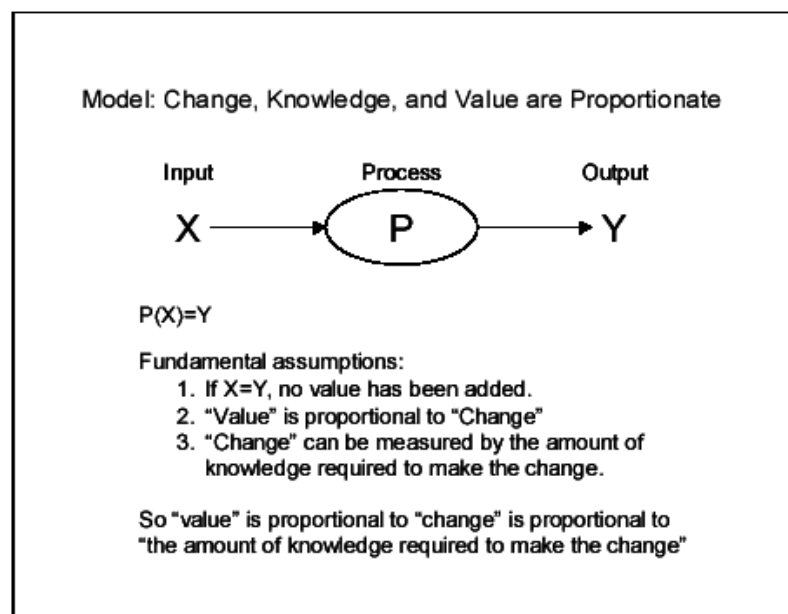
Figure 9.   Assumptions of KVA (From: Housel and Bell, 2001)

But cost has its limitations. While some functions within an organization are direct revenue producers, therefore producing a numerator for the equation, most are very hard to determine. For example, how much revenue does the janitorial staff produce within a business entity? Most would agree that without the janitorial staff, there would be problems, morale would decline, productivity would decline and possibly sick days would increase. But the janitorial staff does not produce direct revenues. So, that function is considered a cost center. As a cost center, it is judged on its ability to keep costs down and meet a target. If it succeeds, it has met its goals.

But the janitorial staff is part of a larger whole, that produces goods and services which it sells to the public. There is revenue generated by the "company", not just the sales and manufacturing functions. So if the process of the janitorial staff produces enough value to justify its costs, then it too must play a part in revenue generation. By applying the concepts of KVA to the janitorial staff, and every other function in the company, defining the surrogates and determining the value produced by the janitorial function, then overall revenue can be allocated to the janitorial staff. This will help the executives to better determine which functions within the organization actually produce the most value, and can better allocate costs, bonuses etc.

Of the four methodologies previously discussed, only KVA produces a numerator, which is critical to actually determining the value of a process. By having a ration, there is a more complete measurement of return. For those valuation processes without a numerator, and a "cost" denominator, there can never be a clear picture of process value. The goal must not be to drive the costs down as far as they can go, the goal must be to create the most value from the process.

1.   How KVA Works

One of the great powers of KVA is its relatively simple methodology for determining value. Housel and Bell have defined three different ways to establish the value of knowledge embedded in both the people and the systems of an organization. Each of these three approaches has a seven step process, as outlined in Figure 10:

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- Learning Time: Learning time uses the basic measure of how long it takes to learn how to perform a given function. That learning time is then multiplied by the number of times that function is performed over a given period of time.

- Process Description: Describes products in terms of the number of instructions required to reproduce them. The number of instructions is then multiplied by the number of times the process executes.

- Binary Query Method: Create a comprehensive set of yes/no questions such that all possible outputs are represented. Multiply the length of the yes/no string for each subprocess by the number of times the subprocess executes.

While it does not matter which of the processes is applied, and there are other ways in which KVA can be measured, what is important is that all the knowledge in a process or company be done in the same manner to ensure common comparisons (Housel and Bell, 2001).

Steps	Learning time	Process description	Binary query method
1.	Identify core process and its subprocesses.		
2.	Establish common units to measure learning time.	Describe the products in terms of the instructions required to reproduce them and select unit of process description.	Create a set of binary yes/no questions such that all possible outputs are represented as a sequence of yes/no answers.
3.	Calculate learning time to execute each subprocess.	Calculate number of process instructions pertaining to each subprocess.	Calculate length of sequence of yes/no answers for each subprocess.
4.	Designate sampling time period long enough to capture a representative sample of the core process's final product/service output.		
5.	Multiply the learning time for each subprocess by the number of times the subprocess executes during sample period.	Multiply the number of process instructions used to describe each subprocess by the number of times the subprocess executes during sample period.	Multiply the length of the yes/no string for each subprocess by the number of times this subprocess executes during sample period.
6.	Allocate revenue to subprocesses in proportion to the quantities generated by step 5 and calculate costs for each subprocess.		
7.	Calculate ROK, and interpret the results.		

Figure 10.   Approaches to KVA (From: Housel and Bell, 2001)

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IV. DESCRIPTION OF THE DOD BPR WEB-SITE

A. OVERVIEW

This chapter describes the prototype development of the DoD BPR Web-Site that will be utilized as an Information Technology Enabler (ITE) for conducting Transformation within the DoD. The primary sponsor for this product is the Department of the Navy – Chief Information Officer (DoN – CIO) and therefore the look and feel of the Graphical User Interface (GUI) mimics that of the DoN – CIO web-site. The working prototype is a tool to help demonstrate the principles of BPR that when combined with the power of an ITE via the web can provide the tools necessary for measuring current and future processes, and analyzing the data of current processes and future reengineered processes. Using the World Wide Web (WWW) as the backbone of this ITE will make available the tools to the entire DoD at a low cost. The primary purpose of this chapter is a proof of concept prototype to provide a web-based transformation enabler for the DoD.

B. PROTOTYPE DEVELOPMENT TECHNICAL DESCRIPTION

The construction of the application server prototype required the use of several software tools. The table below provides a synopsis of the tools used and their purpose within the project.

Tools	Purpose
Macromedia Studio MX • Dreamweaver MX • Fire Works MX	Primary tools for creating HTML and ASP code based web pages.
MS Access XP	Used to design and implement the data base structure for a 3 tier ITE
MS Internet Information Services 5.0	Allow Macromedia Dreamweaver UltraDev 4 connection to server and http and active server page support of web pages
MS IE 6.0	Primary testing platform for displaying and entering data

Table 2.   Primary ITE Development Tools

1.   Thin-Client Three-Tier Architecture Overview

With the decline of the mainframe computer the dawn of the client/server was established. However, this was not significant enough for the enterprise level strategic requirements. Strategic enterprise applications residing in a client/server environment became like an expensive car with too many widgets and computer controls. The client/server architecture was also a high maintenance item. Data was no longer contained on one mainframe but was distributed throughout the enterprise with no corporate grasp on the data. Companies began to feel the corporate knowledge seep uncontrollably out of touch. With the internet came new ideas on how to harness corporate knowledge and at the same time share the data with everyone. This was the birth of the Thin-Client three-tier Architecture.

A typical representation of a 3-tier architecture consists of 3 levels or tiers of computing roles. "In a 3-tier architecture the database is separated from the presentation layer (user interface) by the business and data layers, enabling more scalable, robust solutions. Web applications are ideal for three-tier architecture, as the presentation layer is necessarily separate, and the business and data components can be divided up much like a client-server application" (Tanguay, 2002). Figure 11 is a typical graphical representation of a 3-tier architecture.
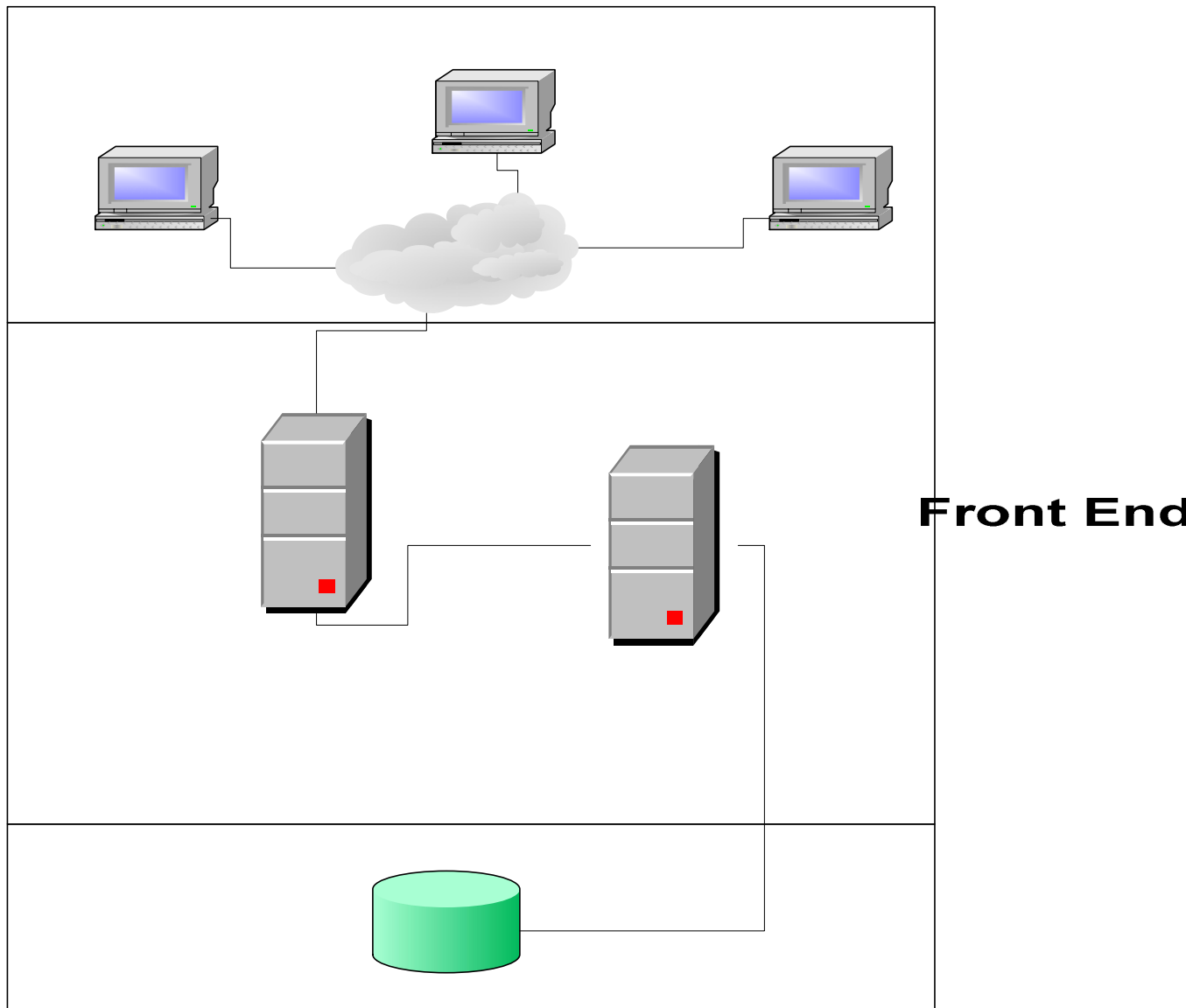
Figure 11.   Three-Tier Architecture

Front End

Client

Middle

The presentation layer, as referenced by Tanguay, is found in the user interface or client which is the Front End or 1st tier. The 1st tier contains all the presentation and application logic The Front End connects to the Middle or 2nd tier by a Wide Area Network (WAN) or Local Area Network (LAN) as depicted by the "cloud." The Middle tier contains the Web Services and Application Servers which work together take request from the clients and execute their request by interfacing with the Back End Tier or 3rd tier. The 3rd tier contains all the Database connectivity and logic to store and transport data according to instructions from the Middle tier.

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2.   Development of the 3 Tier Architecture

Figure 12 will serve as the foundation upon which the DoD Transformation ITE supporting infrastructure will be built. The following sections of this chapter will focus on the details of development of this foundation. The first and foremost important tier to develop is the data base server. The Front End tier presentation layer and application will be built together. The Middle tier is simply server software installation and configuration and will be addressed last.

3.   Database Design

The database created for the DoD Transformation ITE follows the relational database model. The relational database model was designed in 1970 by E. F. Codd. This model was designed to store information data in table format in order to organize data and maintain relationships between the data. In the relational model, a table is a collection of similar records with common attributes. Each row in the table represents a different record and each column in the table corresponds to a different attribute (field). Tables are linked together using keys. The resulting database schema, is presented in the figure below.

When choosing the database program to be used for this proof of concept the following considerations were given for choosing MS Access 2000:

- Widely available
- Easy to learn
- Inexpensive
- Suitable for small web applications
- Easily scalable to a more robust database like SQL Server
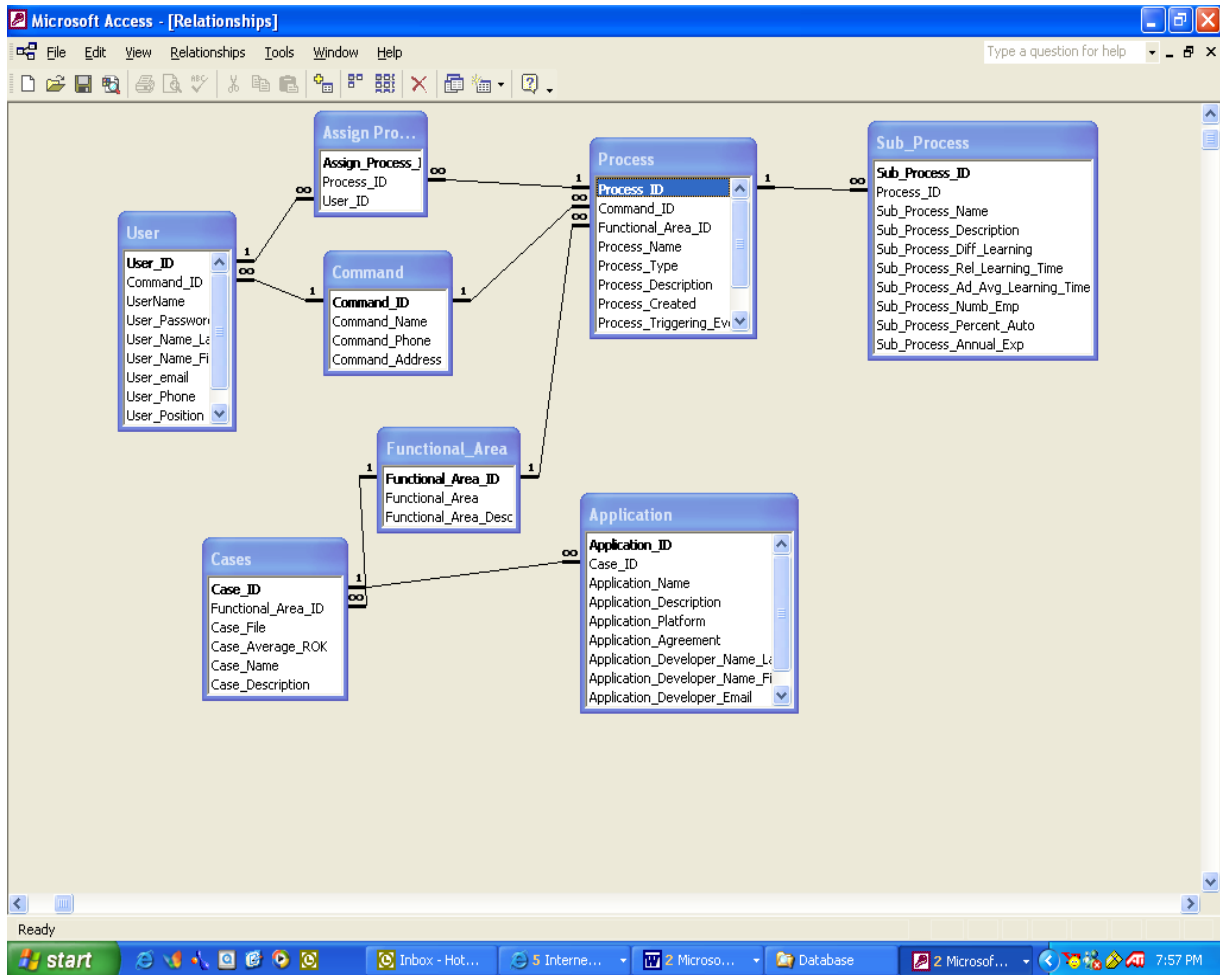
Figure 12.   TITE Database Schema

a.   Connection to the Database

In the three tier architecture it is necessary to connect the database to the application server. This is done using Active X Data Objects (ADO) through the Open Database Connection (ODBC). Before making a successful connection, the database must be registered with a system data source name (DSN) in the ODBC applet located on the server control panel. Once registered, the connection may be established using ADO code in the web page.

4.   Prototype Web Application Design Description

The design of the DoD Transformation Web-site prototype was primarily concerned with function over form. The user interface was copied directly from the

DON – CIO home page, http://www.don-imit.navy.mil, in order to maximize familiarity and ease of usability. The functional part of the transformation application is performed within this GUI.

a. *Site Map Design*

The site map in Figure 13 represents an aggregate view of the DoD Transformation Application utility. This site map simplifies the actual site map. When the DON – CIO homepage was copied so was all of the external links. This figure reduces the site to the specifics of the DoD transformation proof of concept study.
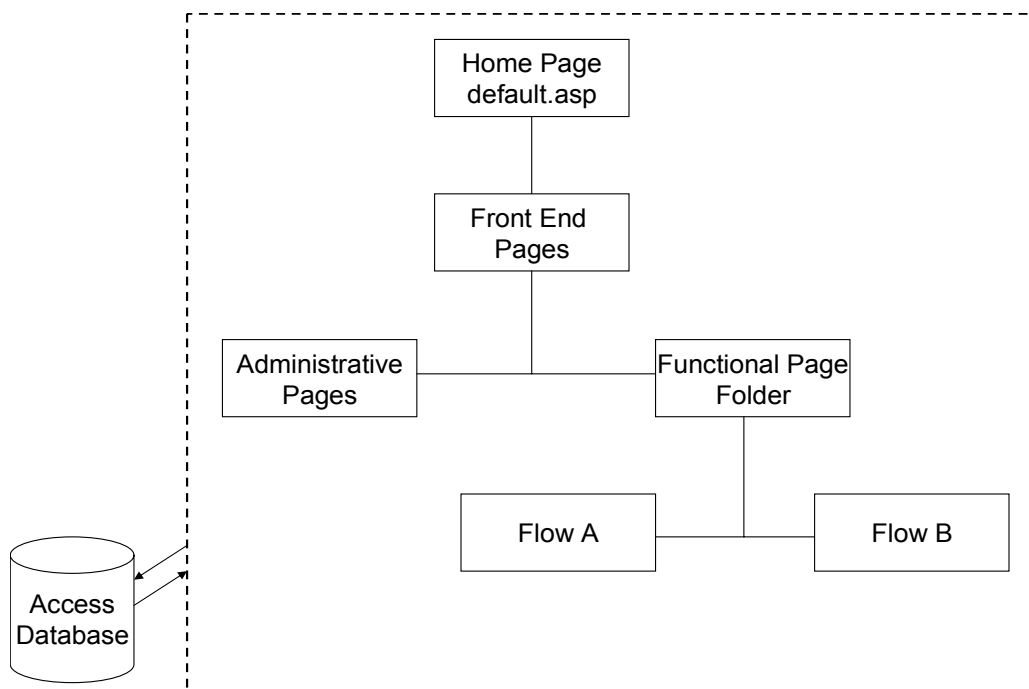
Figure 13.   Aggregate Level Site Map

This description of the sitemap will only include screen shots of the portions that are not within the Functional Page Folder. This portion will be discussed in detail in Chapter V.

The gateway page is labeled "Default.asp." This page primarily a gateway that can be used to introduce the user to the principles of BPR, Transformation within the DoD and the applicability of BPR to Transformation. This page is simply a static web page and has no connectivity to the database. This page can also be used to update the

Transformation Community on the latest news and successes stories of transformation within the DoD. Figure 14 is a screen shot of the default.asp page. This page will also provide links to user registration, login screens and BPR/KVA overview tutorial.

Figure 14.   TITE Home Page Screen Shot

From this view one can see the user interface that was copied from the DON – CIO homepage. It contains the upper menu area with graphics and the left – sidebar menu area. The links "Register," "Sign In," and "Overview" along with the construction banner and all portions below the construction banner will contain the work and process design area of the application.

In Figure 15, the Front End page grouping refers to all the pages that are used for registration, log in, and welcome pages. A more detailed view of the "Front End" page site map is represented by Figure 16 below.
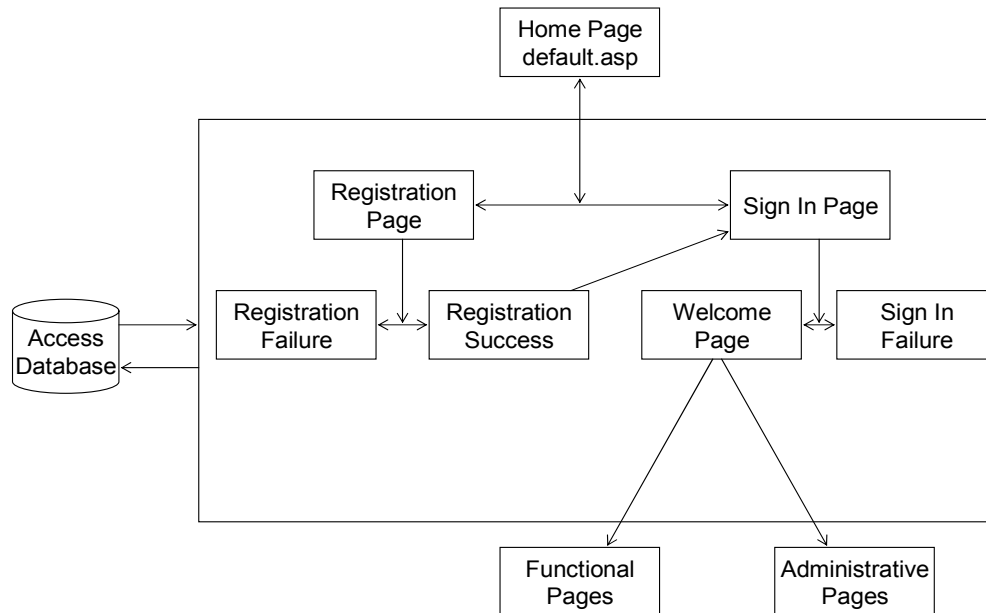
Figure 15.   Front End Pages Map

All users are required to be registered at the Transformation Web ITE. A user may be registered by one of two methods. A user may register manually via the registration page or the user may be registered by his Command Transformation Team (CTT) leader via the use of the Admin Pages which will be discussed later in this chapter. The registration process requires the user to choose a user name or Login Name and a password and provide other demographic details such as name, rank and command. The command selection is done via a drop-down menu that is populated by a list of commands that are currently enrolled in a transformation program.   This list of commands is updated via a database interface or via the web pages. The user name is the only cross-check that is performed at this page. When the user submits the form the application server will perform a validation behavior that will search the database login field to ensure that this login or user name is unique and is not duplicated. If the user name already exists then the user will be diverted to another registration page to choose

another User ID. If the User ID chosen is unique then the user will be diverted to the registration success page at which time the user can click a link to go to the sign in page. Figure 16 is a screen shot of the registration page.
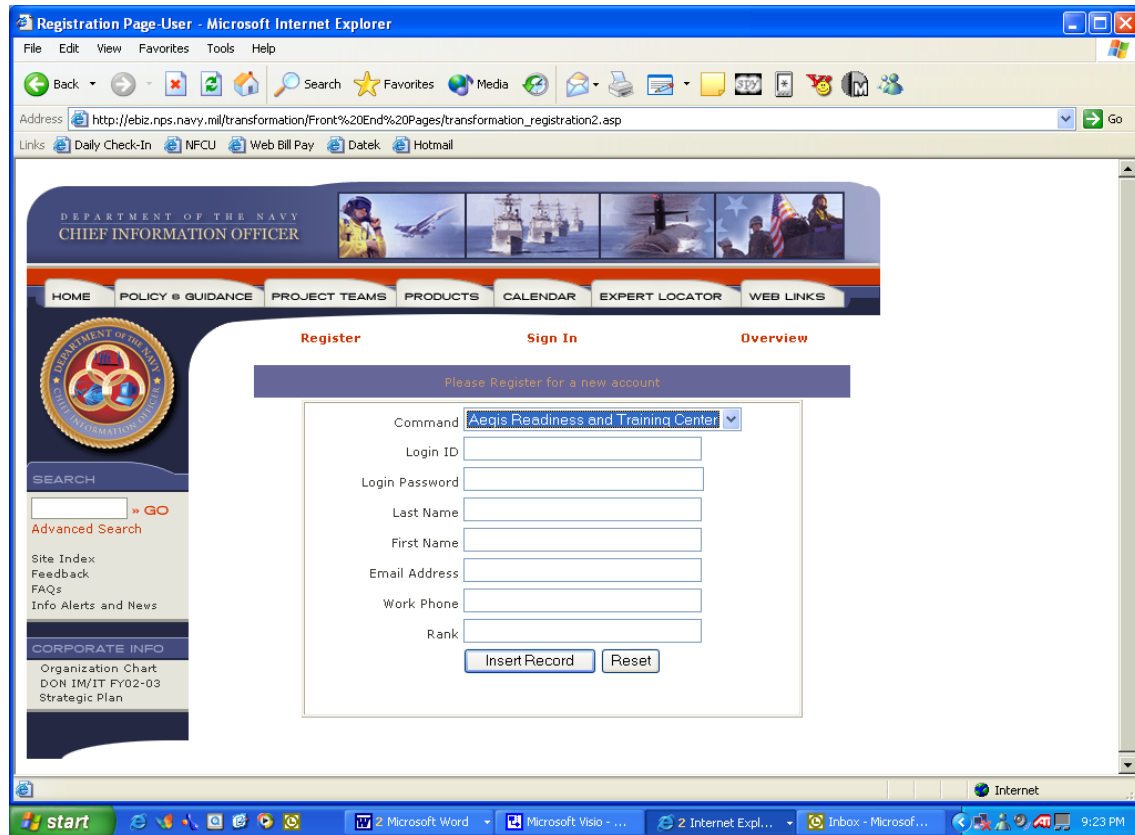
Figure 16.   TITE Registration Page Screen Shot

The Sign In page is not unique and is typical in function and form to that of any site that requires a login. Therefore, it will be discussed. Once the user has logged in successfully the site diverts the user to the Welcome Page. The welcome page coding is unique from all other pages in that the page will assign a "Session Variable" that specifically identifies the user to the rest of the site and basically tracks the user throughout the entire process. Database records such as Process table, sub-process table, administrative pages (if user is assigned as an administrator) etc. utilize this session variable for unique identification.   The user will only be able to see those records

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specifically identified by their Command ID and User ID and User Position, i.e. Admin or User. The code that creates the session assignment is documented below in Table 3.

Session Variable Assignment Code

``
<%
        var rsCommand__MMColParam = "1";
        if (String(Session("MM_Username")) != "undefined" &&
            String(Session("MM_Username")) != "") {
    rsCommand__MMColParam = String(Session("MM_Username"));
        }
%>
<%
            Session("Command_ID")   =
            (rsCommand.Fields.Item("Command_ID").Value)
            Session("UPosition")   =
            (rsCommand.Fields.Item("User_Position").Value)
%>
``

Table 3.   Session Variable Code

These session variables are now assigned and all record sets may be filtered for specificity of the user. The Welcome Page is shown in Figure 17.

At this point, the Admin Pages section should be mentioned at the functional level only and not given a detailed description. The Admin pages allow both site administrators and the leaders within the individual CTT to manage user accounts. In addition to this function the Transformation Center Administrators may perform Case File editing via the web interface to input case file data for strategic studies and Community Best Practice benchmarking.
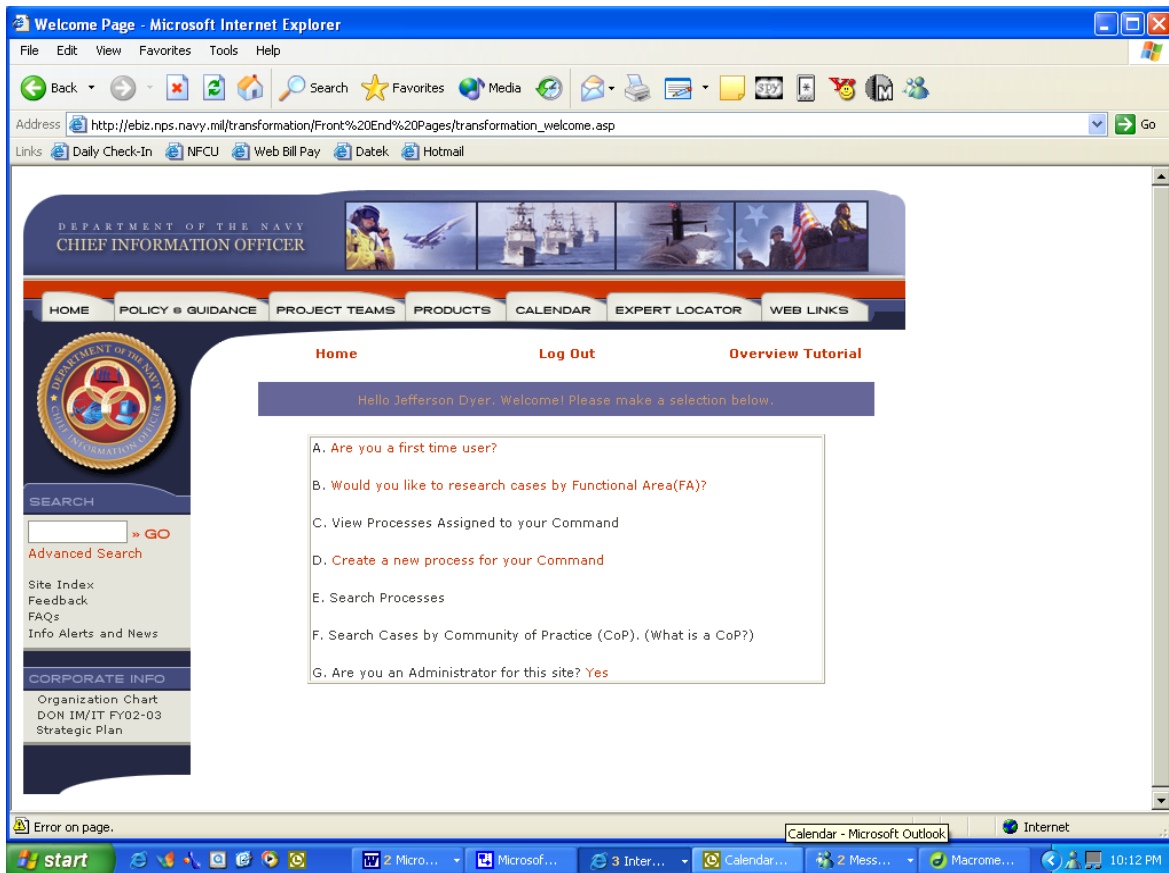
Figure 17.   Welcome Page Screen Shot

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V. APPLICABILITY OF THE DOD WEB-SITE TO BPR AND TRANSFORMATION

A. OVERVIEW

So far, the principles of BPR and KVA have been explained, and the foundation for the Transformation ITE has been described. This chapter will further discuss BPR in the form of "how to" achieve BPR, how to use KVA as your process analysis tool to achieve process reengineering and finally this chapter will integrate BPR and KVA with the Transformation ITE. This discussion will focus its discussion on both the Enterprise Aggregate level of change and also the sub-process level of change within an organization.

B. "HOW TO" BPR

So we have discussed BPR on a macro-theoretical level and now it is appropriate to put theory into a guiding architecture that can be easily understood and put into process steps for completing BPR within a DoD organization.

1. Principles of Business Process Redesign

Earlier the evolution of BPR was explained and now it is important to note that BPR can be described in two waves: first-wave BPR, primarily driven by downsizing came to halt in the mid-1990s. Presently "we are experiencing a growing second wave of BPR that is coalescing around e-business" (El Sawy, 2001). While downsizing influenced the first wave BPR, the second wave BPR is being driven by the confluence of supply change management, fast response management, and knowledge management.

The e-business environment is creating rapid change requirements in enterprise which is directly proportional to the demands of competitors, customers, supplier, and partners. In a very competitive race, enterprises are under enormous time pressure to become e-businesses. "We call the scramble that enterprises are going through to redesign their processes for e-business the 'e-business speed loop' (see Figure 18) and we use this loop as a framework from which to derive the principles of business process redesign for e-business" (El Sawy, 2001)
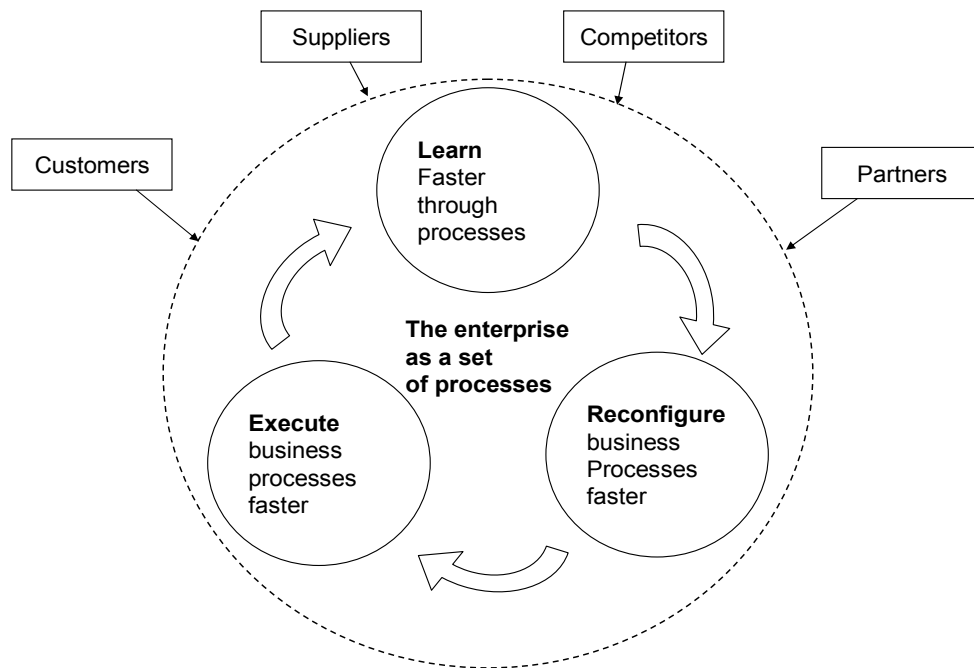
Figure 18.   e-Business Speed Loop (From: El Sawy, 2001)

From Figure 18 the environment is directly influenced or in fact driven by the external entities such as customers, suppliers, competitors and partners. The external entities provide the necessary demand for driving the speed at which the speed loop must turn to meet mission critical changes. In the case of the DoD this speed applies to our transformation efforts. At the enterprise level of the DoD our ability to execute our mission with a downsized force creates this necessity for transformation as placed on us by our customers (the people of the U.S.A.), our ability to supply or re-supply our forces, our enemies and our allies.

The speed loop figure can accurately be applied to the DoD. The DoN, the DoAF, DoA, must learn to **reconfigure** our business processes faster. We need to constantly rethink how we partner and execute our processes with our customers and suppliers in order to take advantage of opportunities. "This will require the capability to reconfigure processes for new partners and new products much faster than in the past and will require much deeper knowledge of partner processes" (El Sawy, 2001).

Likewise, in addition to reconfiguring our business processes faster we will inherently need the capability to **execute** our business processes faster. As the DoD grows with the demands of an ever-changing national strategy our research and development cycle changes, our weaponry changes and our tactics change accordingly. In addition our suppliers will need to re-supply our troops faster in a war-time environment. This growing number of potential "hot-spots" in the world and the increased pressure for the DoD to execute our operational processes faster has never been greater. The DoD will continue to redesign our business processes for fast response.

DoD training will also have to change to meet the demands of new tactical systems, processes, and strategy. The speed loop dictates that we will have to **learn** faster through our processes. This implies that people or personnel will have to learn more faster. This presents the greatest challenge to the DoD in terms of the speed loop. In order to keep up with the changing technology and the demands of national strategy on our personnel it will become incumbent upon us to imbed our "learning" or knowledge in the systems and processes incorporated by our growth. "With the rapid and constant change in the business environment that is accelerating with e-business, the enterprise that can learn the fastest will have the competitive advantage" (El Sawy, 2001).

The speed loop as discussed here provides a framework for deriving the principles of process redesign for e-business. These principles and their can be justly applied to DoD processes because the e-business speed loop can be accurately renamed for DoD as the DoD transformation speed loop. The ten principles for e-business redesign are listed here:[2]

- Principle #0: Streamline
  Remove waste, simplify, and consolidate similar activities
- Principle #1: Lose Wait
  Squeeze out waiting time in process links to create value
- Principle #2: Orchestrate
  Let the swiftest and most able enterprise execute

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[2] The Principles and Tactics of Process Redesign for e-Business are discussed in detail in El Sawy, 2001 Chapter 3.

- Principle #3: Mass-Customize

  Flex the process for any time, any place, any way

- Principle #4: Synchronize

  Synchronize the physical and virtual parts of the process

- Principle #5: Digitize and Propagate

  Capture information digitally at the source and propagate it throughout the process

- Principle #6: Vitrify

  Provide glass-like visibility through fresher and richer information about process status

- Principle #7: Sensitize

  Fit the process with vigilant sensors and feedback loops that can prompt action

- Principle #8: Analyze and Synthesize

  Augment the interactive analysis and synthesis capabilities around a process to generate value added

- Principle #9: Connect, Collect, and Create

  Grow intelligently reusable knowledge around the process through all who touch it.

2. Phases of Business Process Redesign

Now that the foundation for the "how-to" perform BPR this section will describe the different phases of BPR. This description is generic and can be applied for any enterprise including the DoD. It is a macro level description and is intended to be applied to the process for which a CTT[3] would utilize by incorporating the Transformation ITE in its transformation effort.

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[3] For this description, CTT will be synonymous with the BPR team as described by El Sawy, 2001. The primary difference is that CTT is more easily understood verbage as used by the DoD.

- According to El Sawy, there are three phases to BPR:
  - Scoping an enterprise process
  - Modeling, analysis, and redesign
  - Integration[4]

For the rest of the discussion on Business Process Redesign Figure 19 and Table 4 will be used. Figure 19 will be utilized solely as the supporting model of redesign and Table 4 will be used as a quick reference to the overall redesign process.

Phase 1 Scoping the process	Phase 2 Modeling, analysis, and redesign of process	Phase 3 Planning process integration
Activities		
• Operationalize process performance targets • Define process boundaries • Identify key process issues • Understand best practices and define initial visions • Outline data collection plan and collect baseline data • Plan for modeling phase	• Continue data collection • Model "As-Is" baseline process • Analyze and diagnose "As-Is" process • Design and model "To-Be" process alternatives • Analyze "To-Be" process alternatives and select best alternative • Plan process integration phase	• Provide workflow model or requirements for IS design • Adjust process design • Plan for process implementation
Deliverables		
• Process Scoping Report	• Software-Based Process Model • Partner Impact Report • Process Reengineering Report	• Process Integration Plan
Key Participants		
• Process Owners and Partners • Customers of Process • BPR Team	• Process Participants • BPR Team	• IS Design Team • BPR Team

Table 4.   Phases of BPR (From: El Sawy, 2001)

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[4] For the purpose of this thesis, only the first two phases will be discussed. It is assumed that integration of a redesigned process will be done through the current DoD acquisitions and procurement process. In addition, integration of a redesigned process will be another opportunity for further research and prototype development.

a.   *Scoping the Process*

In Figure 19, the foundation for the BPR redesign model is the share of process knowledge. This sharing is required throughout the entire redesign sequence. It is notably significant in terms of the foundation of scoping the process that has been selected. According to El Salwy in Table 4, the key participants include the process owners and partners, the process customers (the stakeholders) and the BPR Team or in our case the CTT. When scoping the process occurs the foundation for the analysis of the process in Phase 2 has been defined and the desired outputs and the inputs to the process have been defined. During this phase, the activities include:

- Operationalize process performance targets
- Define process boundaries
- Identify key process issues
- Understand best practice and define initial visions
- Familiarize participants with BPR software
- Outline data collection plan and collect baseline data
- Plan for modeling phase

The deliverable for this phase that marks the first milestone and entrance into Phase 2 is the Process Scoping Report. This report summarizes Phase 1 findings and reports to the process owners for review of accuracy to provide a feedback loop to the CTT. The distribution may include others such as the project sponsor etc. Foremost this document is used as a "focusing and guiding device for the BPR core team as it starts the modeling phase" (El Sawy, 2001).
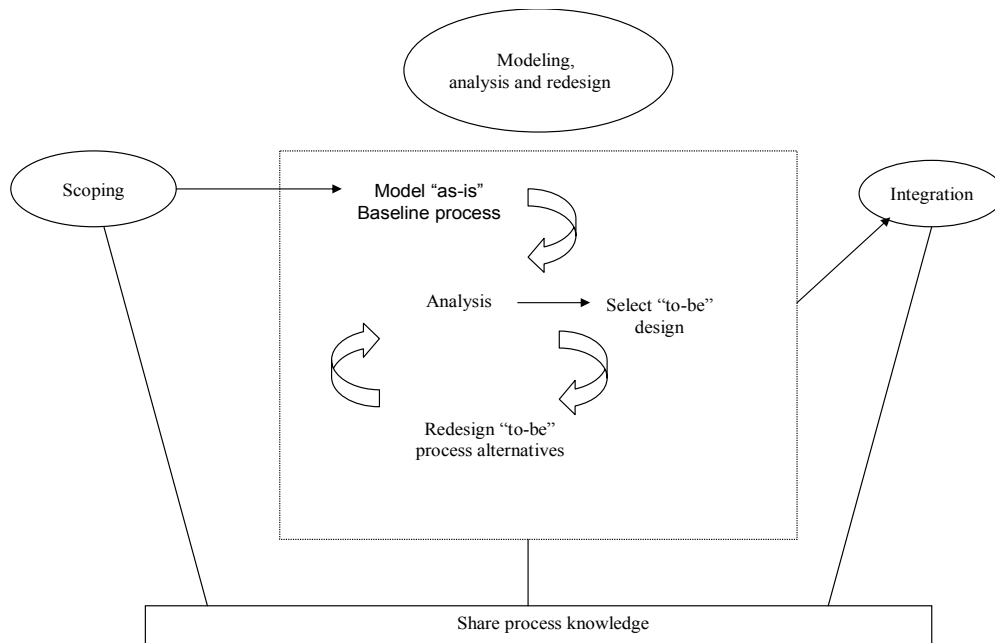
Figure 19.   Phases of Business Process Redesign

b.   *Modeling, Analyzing, and Redesign of the Process*

Phase 2 of the Business Process Redesign process is composed of the modeling, analyzing and redesign tasks. This phase will take the CTT through a process which forces the team to draw a picture of the current process or "As-Is" process that is undergoing redesign, they will then analyze the "As-Is", then using an iterative technique the design team will redesign the "As-Is" into several alternative new processes or "To-Be" processes. These new processes will then be analyzed using the same criteria as utilized in the "As-Is" process and choose the best "To-Be" alternative. By studying Table 4 and Figure 19, one can see that this iterative process will not be as intuitive as scoping the process. For the purpose of modeling the "As-Is" and designing the alternative "To-Be" processes several different software tools are available. The CTT can simply use a graphics program such as MS PowerPoint, MS Visio or more robust modeling tools such as a Rational Rose, IDEF0. El Sawy suggests using Holosofx Workflow BPR Modeling software that comes with his book. It is dependant upon the abilities and experience of the CTT and the level of complexity of the process being

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modeled. A key note to remember is that the CTT and Process Participants must be working closely together to ensure that the model drafted accurately reflects the real life process flow. A sure-fire pitfall to avoid is modeling a process that is described formally by organizational doctrine and not the actual sequence of events. Many times experienced workers and managers through the natural growth of an organization or department may find work-a-rounds, or shortcuts that do not follow published directives. According to El Sawy, the tasks that need to be completed during this phase are:

- Continue data collection
- Model "As-Is" baseline process
- Analyze and diagnose "As-Is" process
- Design and model "To-Be" process alternatives
- Analyze "To-Be" process alternatives and select best alternative
- Plan process integration phase

This table also shows that the deliverables are a software-based model and a process reengineering report.

Although a process model can be drawn and analyzed using hand-drawn techniques and it can be completed using "non-intelligent" modeling software such as MS PowerPoint, there are ten reasons for choosing an "intelligent" software modeling program listed by El Sawy:

- Graphical representation of process on a timeline
- Examining process at any level of detail
- Graphical objects that are "live" with data
- What-if capabilities
- Animated simulation
- Case generation and analysis
- BPR software is a business tool
- When you can explicitly describe a process, you deeply understand it
- A shared business language for communicating about processes and BPR
- BPR software changes the way you think about processes and BPR

These 10 advantages were utilized when developing the prototype. A shortfall of the prototype which is really beyond the "proof of concept" goal of this paper

is animating the simulation of the processes. Integration of animated simulation and what type of simulation would be best for a DoD software modeling tool is a recommendation for future study and enhancement of the Transformation ITE.

C.   ANALYSIS METHODOLOGY FOR BPR

In the previous "How To" do BPR we loosely discussed the aggregate picture of the key components and framework within which to perform BPR. Fundamental to performing BPR for redesign is the analysis methodology described in Phase 2 of Business Process Redesign. Particularly for the DoD the analysis method chosen must be one that can be defined and integrated synonymously throughout the DoD.

1.   Knowledge Value Analysis

Chapter III described that a process is a reservoir or knowledge that is stored in the people and expert systems of the process. The value of this knowledge is not easily understood until a key person is removed from the process or the expert system is removed from the process. For example in the day to day tasks of business email is very important. It transfers information from people to people to conduct the business of the day. This vital form of communication can virtually stop work if the email server goes down or even worse the web server goes down and now the entire workplace will come to a complete standstill. Or even yet a division has a person that is so experienced in his job that no one else can fill their shoes in the event that they call in sick. This too impedes the workflow in a division. Single points of failure in an expert system or the personnel in a process highlight how valuable their "knowledge" is. To re-cap from Chapter III the value of knowledge or KVA can be measured using several different methodologies. These are:

- Learning Time
- Process Description
- Binary Query Method

These three measurements provide a valuable number for the Return On Investment equation or in this case Return on Knowledge (ROK) equation. For application within the DoD we will focus our efforts on Learning Time (LT). In order to understand ROK, with respect to LT knowledge must be defined in a particular way. "It is the know-how required to produce process outputs." (Housel and Bell, 2001). In other

words, knowledge is proportionate to how long it takes to learn it. Learning time is a quick convenient method for measuring knowledge in a system. In an application to the DoD, or specifically to the Navy an maintenance technician will take three months to qualify or learn the 3M system and another two months to qualify on the equipment that the technician will be performing maintenance on. The costs associated with the sailor taking five months to qualify on the maintenance of a piece of equipment is also a know quantity. The total cost of the process of qualifying to perform maintenance can be now be defined. Using LT as a surrogate for the return in a ROI problem we can now define this ratio as a Return on Knowledge (ROK) (House and Bell, 2001). In this example, the ratio would be described as:

$$\frac{K}{C} = ROK$$

K = Knowledge allocated to Revenue[5]
C=total cost

Using *ROK* we can now define value of knowledge in the maintenance process or the *KVA* to the process. The real power of this small example can be illustrated best when this procedure is applied on an aggregate or enterprise level and processes are measured in the aggregate. Housel and Bell demonstrated this in an example case. Table XX (Housel and Bell, 2001) illustrates a simple High-Level Aggregate KVA analysis of Exodus Communications. This table was derived by using a BPR approach by interviewing the process owners and obtaining average learning-time estimates and a rough estimate of the number of process instructions to complete the process.

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[5] For the purpose of this exercise revenue is used. In the case of a DoD application a surrogate for revenue would have to be defined because the DoD does not generate revenue.

	Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11
	Core Areas	Rank in terms of difficult to learn (1=easiest, 3=hardest)	Relative learning time (total is 100 months)	Number of Employees	Percentage of Automation	Amount of knowledge embedded in auto-mation	Total Amount of Knowledge	Percentage of knowledge allocation	Annual revenue allocation (in millions of U.S. dollars)	Annual expense (in millions of U.S. dollars	ROK
	S&GA	1	20	855	80%	13680	30,780	34.18%	$82.70	116.8	70%
	Operations	3	45	600	60	16200	46200	47.98	116.1	197.2	59
	Manage-ment	2	35	255	80	7140	18065	17.84	43.3	51	85
	Total		100	1710		37020	90045	100%	$242		

Table 5.   High-Level Aggregate KVA Analysis

From Table 5 column descriptions:

- Core Areas: Identified by the process owners at Exodus Communications

- Difficulty to learn: This is a ranking based on easiest to hardest and assists in determining numbers for column 3

- Relative Learning Time (RLT): LT normalized so that Total LT (TLT) = 100 months

- Number of Employees within each Core Area

- Est of % that Core Area is automated. Used to determine values for column 6.

- Total amount of knowledge (process instructions) allocated to each core area that is automated. Derived from:

Column 3 x Column 4 x Column 5 = Column 6

- Total Amount of Knowledge:

Column 3 x Column 4 + Column 6 = Total Knowledge

- Percentage of Knowledge Allocation (KA): This value is taken from the Total Knowledge per Core Area and its percentage of the Total Knowledge for the Enterprise:

Example: S&GA

$$\frac{30,780}{90,045} = 34.18\%$$

- Allocation of Total Revenue to Knowledge or simply the KVA to each core area. This value is derived by taking the total revenue and multiplying it by KA from column 8[6]. This is the numerator in the ROK equation
- Annual Expense is simply the denominator in the ROK equation.
- ROK per Core Area.

From this analysis one can see that the Core Area that has the lowest ROK is Operations. Consequently, the other data in the analysis validates this. It is the hardest area to learn, its process instructions is the highest and it is the lowest in terms of the percentage of Knowledge embedded in automation. This is an area that would probably be the first to study for redesigning. How much of this core area can actually be automated? If we increased it automation by just 10% then the effect on the total annual expenditure because automating would in turn cause a reduction in work force, automation would mean higher revenues ROK would then grow substantially. The overall effect of embedding knowledge in automation or in an IT system creates substantial changes in the way we do business. Embedding Knowledge in IT within the e-business environment would have similar revolutionary results as robots in automotive production lines had on the automotive industry.

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[6] It is important to understand that in traditional terms Management is often viewed as strictly a cost center and to save money or increase revenues a company may cut back on personnel within management. With ROK, a surrogate is defined for value (Knowledge) and Management is no longer viewed as a cost center and revenue can be allocated to this core area. The power of KVA on ROK can be applied to all cost centers including the janitorial staff because each has value to the enterprise.

For further study we must now discuss the application of KVA to a functional area or core area process. The process within a core area undergoing a redesign effort is identified in the example of Table 6 below. This table is from Housel and Bell 2001 as a further study into KVA and how it can be applied not only to the aggregate level but also at the subprocess level. Without detailing the individual columns again it is simply mentioned that the Seven Steps of KVA as described in Chapter III were applied to the Sales Provisioning Process at Exodus Communications. What is highlighted here is the power of comparing the departments process ROK to the industry average. This comparison will help strengthen the argument for redesign and also set an achievable benchmarks in the redesign analysis.

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Sub-process	Learning Time (weeks)	Number of employees	Amount of Knowledge embedded in IT (25%)	Total amount of knowledge	Percentage of knowledge allocation	Annual revenue allocation (in millions)	Process cost (in millions)	ROK
Sales	240	8	672	2592	15%	$13.70	$12.20	112%
Service selection and MAD	400	8	1120	4320	25	22.8	24.3	94
Procurement	60	5	105	405	2.5	2.3	3	77
Integration	500	5	875	3375	20	18.3	20.3	90
Trouble-shooting	500	6	1050	4050	23.5	21.4	19	1.13
Final Testing	300	6	630	2430	14	12.8	6.4	200
Total	2000	38		17172	100%	$91.30	$85.20	107%

Table 6.   KVA on the Sales Provisioning Sub-Process

Within the BPR Redesign Process Model by El Sawy, the Seven Steps of KVA have taken the redesign process through the following areas:

- Scoping the Process
- Continue Data Collection
- Modeled the "As-Is" process
- Analyze and diagnose the "As-Is"

The next steps according to El Sawy, is to:

- Design and model the "To-Be" process alternatives

- Analyze the "To-Be" process alternatives and select the best alternatives

- Plan process integration phase

For the purpose of applying KVA to the redesign process we will simply state that after the principles of business process redesign have been applied to several alternative "To-Be" processes then the Seven Steps of KVA can be applied to the "To-Be" alternatives. The alternative that results in the best ROK should be the one chosen to plan integration. When making a change it will likely be an incremental redesign however the DoD Transformation vision calls for a "Radical" change. KVA can be applied to analyze a radical change also and is not only suited for incremental change. So, the "To-Be" analysis of a Radical Change should be a radical increase in ROK. If the analysis does not reflect radical increase in ROK, then you have, by definition, added no value to the process.

D. DEVELOPMENT OF TRANSFORMATION ITE FOR PROCESS REDESIGN

This section of Chapter V is focused entirely on the development of the Transformation ITE functional pages. These pages incorporate the Business Process Redesign Principles discussed previously and the Seven Steps of KVA as defined by Chapter III and described in this chapter.

1. Prototype Functional Story Board

The purpose of the story boarding was to focus the develop of the Transformation ITE and to ensure that the principles of BPR were being achieved in the Business Process Redesign process flow. The story board included Flow A, Flow B, Flow C, and Flow D. For the purpose of this paper only Flow A and Flow B will be demonstrated and in addition to simplify this discussion ITE Tutorials referenced in the story board will be alluded to their use and not demonstrated. Online Tutorials is an area of enhancement that will need to occur to make this ITE truly useful in the field. In addition, the tutorials will also be another opportunity for further research and study.

Refer to Figure 20, Flow A. The description of Flow A will pick up at the Welcome Page as described in Chapter IV. To recap this page has three developed decision links for the user. From Flow A the user can choose to view an online tutorial if they are a first time user (choice A), they may Search a Functional Area (FA) (choice B) within the Navy, i.e. Logistics, Acquisition, etc., or they may create a new process for redesign (choice D).

- Choice A is a tutorial which introduces the user to BPR and KVA.

- Choice B is quick rudimentary search of FAs that will allow the user to compare processes within a FA of choice. Such as Logistics.

- Choice D will a allow the user to create a process using the BPR method and make a KVA determination.

It is important to note that the data contained in this Web Based Transformation ITE is strictly fictional and should be viewed as data for demonstration purposes only.

a. Flow A

Flow A is distinctly defined by the ability to compare processes similar to the ones that the user is going to investigate and they can find the ones that outperform the average ROK for that FA. In addition, the portion of Flow A is limited to the user Choice B.

Choice B of the Figure 20, the Welcome Page will take the user to the FA search page. This page has a dynamic menu box that when clicked on will provide a predetermined list of choices, Figure 21.

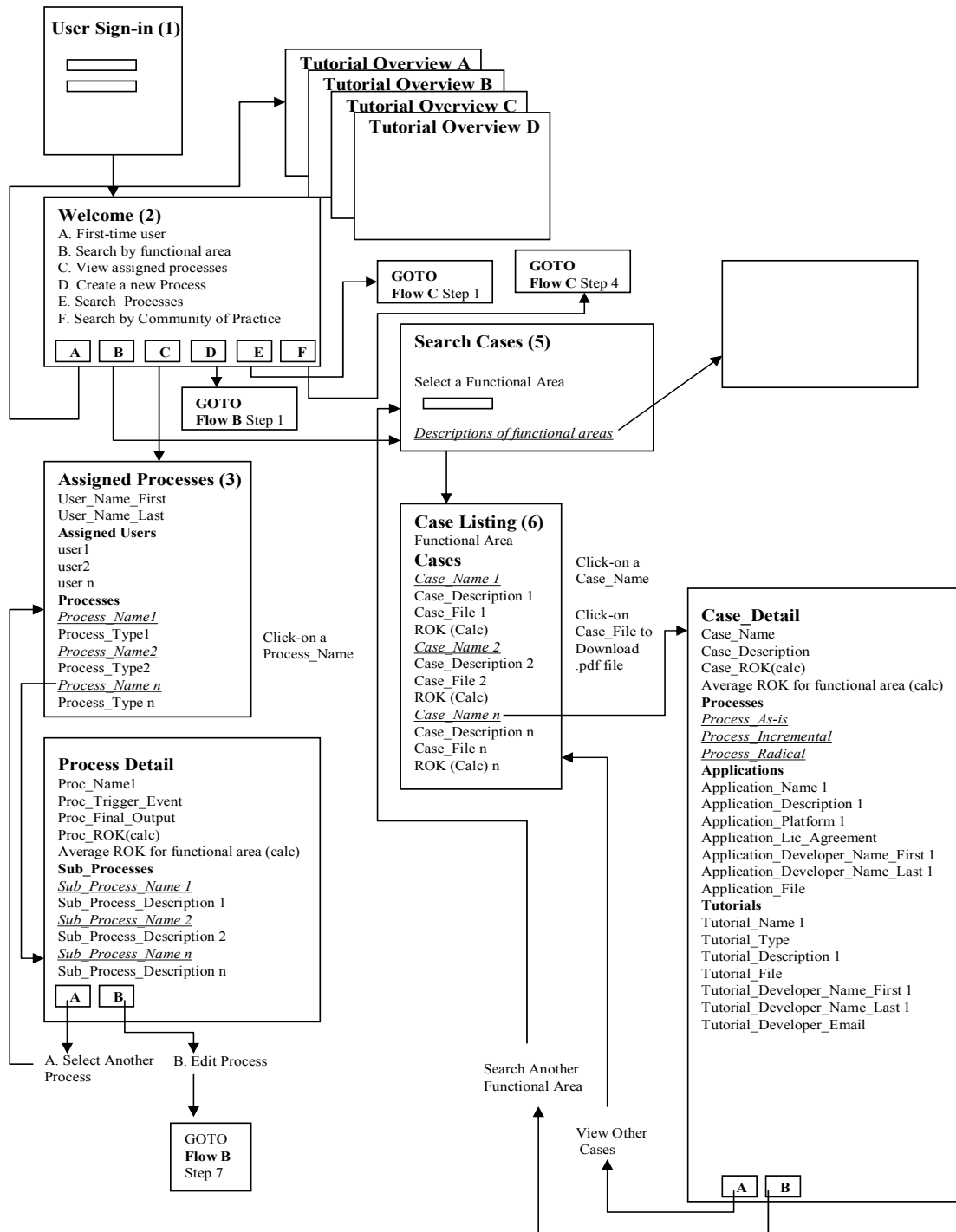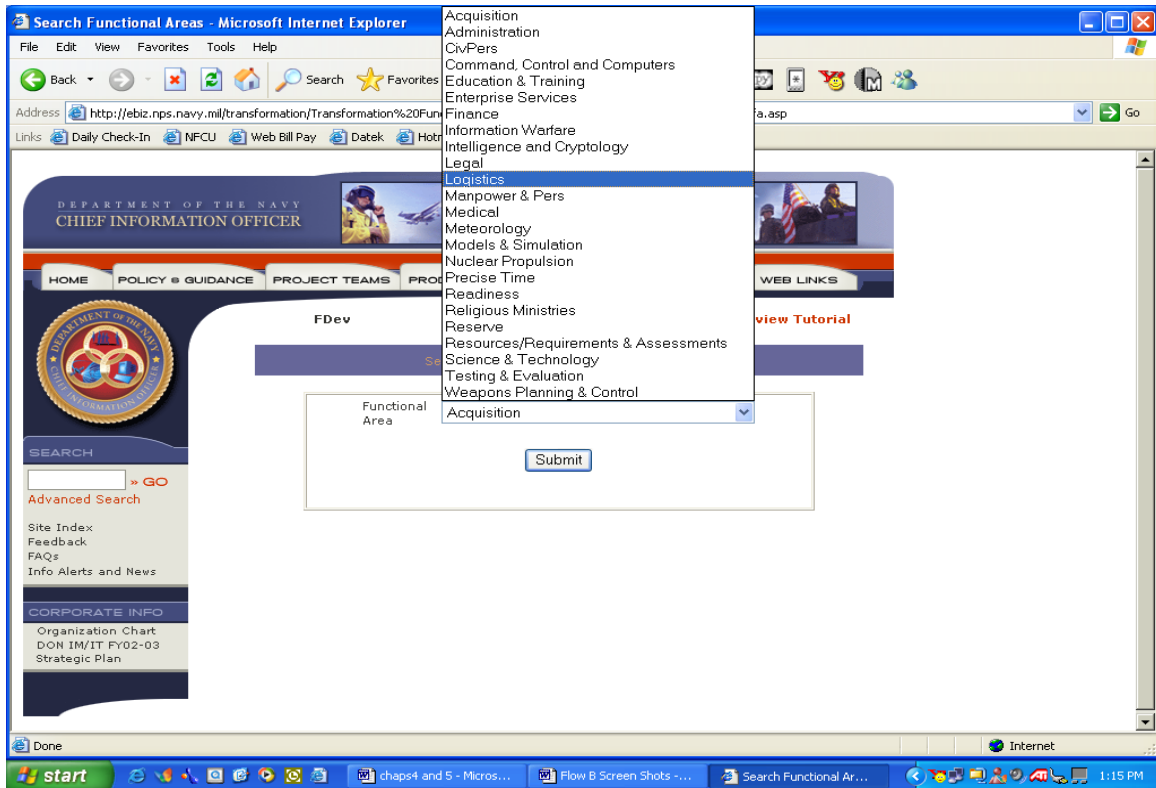Figure 20.   Flow A Story Board

Figure 21.   Functional Area (FA) Search Page Screen Shot

Once a user selects a FA from the list menu then they will be taken to a results page for the search and will be shown all the cases that are related to that specific FA.   Search for the purposes of demonstration only is limited to Acquisition and Logistics. The search results page can be viewed in Figure 22 below.
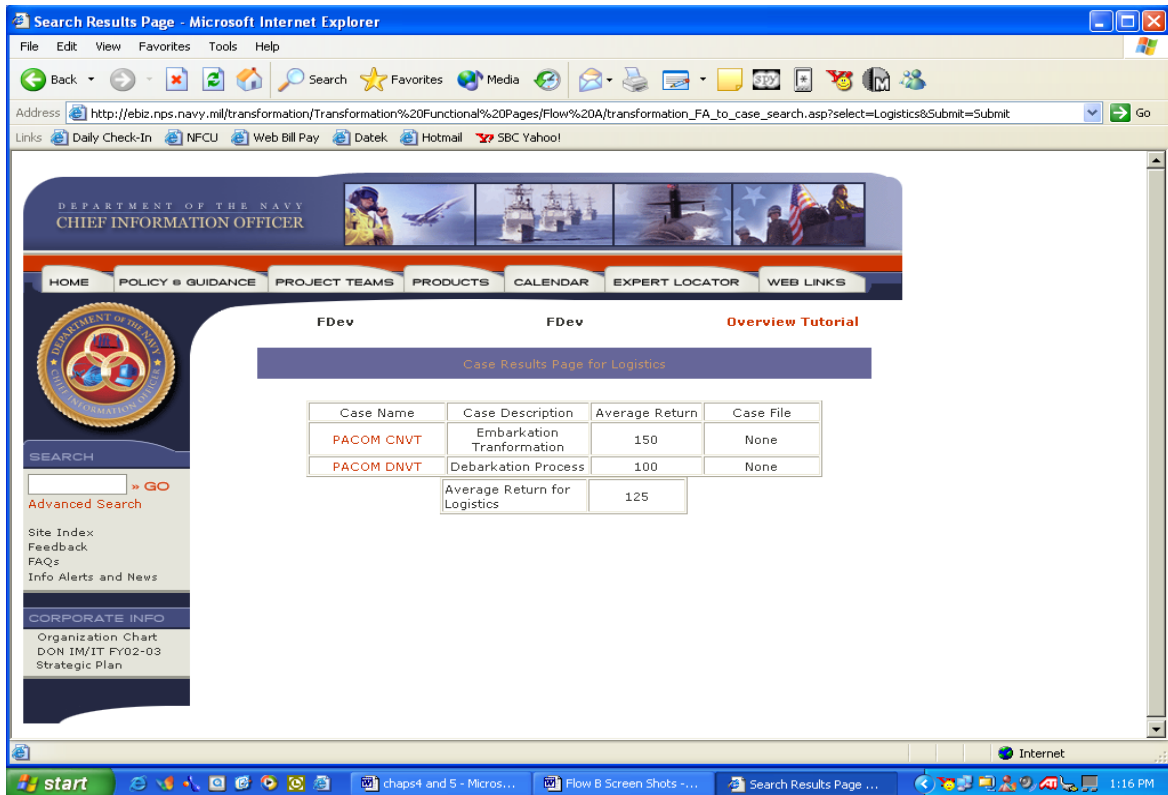
Figure 22.　　FA Search Results Page Screen Shot

Of note here the data in the data base is fictional data base but all calculations performed are performed on the data that is "live" or dynamic. These calculations are conduct within the database queries and not in the client application. The average ROK displayed is calculated within the Access Data Base. This query is pulling the dynamic data from the database for calculation. Presented for the user is two fictional cases that displays the Case description and its Average ROK. Below this table is the calculated field of the overall average ROK for the Logistics FA.

From here the user may chose to view more detail of the presented choices by click on the one that they would like to study. If the user clicks on PACOM CNVT then the dynamic link will take the user to the Case Detail page Figure 23. The Case Detail page also contains a link that will pull up Figure 23 the Process Detail Page for PACOM CNVT. This link is missing from this screen shot.

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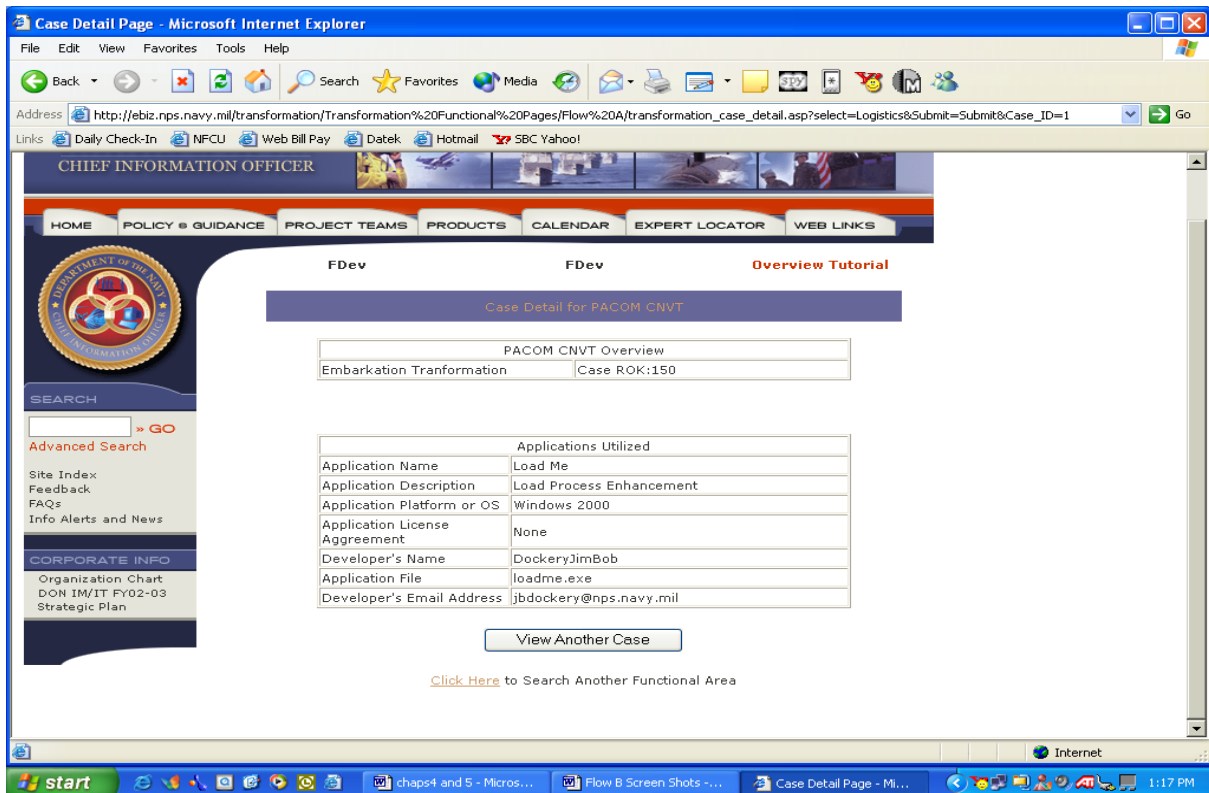
Figure 23.   Case Detail Page Screen Shot

From this view the User may choose to search another FA or they may choose to view another Case within that same FA. This functionality of Community of Practice Best Practice is very basic but demonstrates that it can be done quickly and it can guide the user to results based search to apply to their own transformation efforts.

b.   Flow B

Flow B comprises the bulk of the Transformation functionality within the Transformation ITE. Flow B forces the user to conform to the constraints of the Business Process Redesign model in Figure 19 by stepping them electronically through the phases of Table 4. In addition, this ITE also walks the user through the Seven Steps of KVA via tutorials and a KVA matrix generated by the application. For the Flow B description, please refer to Figure 24.

Create New Process (1)
What is (are) the event(s) that
Trigger the process?
Example: ****************
****
****

What is (are) the final output(s)
of your process?
Example: ****************
****
****

Diagram Sub-Processes (5)
Diagram sub-process that create
final output.
Example:

Click to Down-load the diagram
tool or use the tool of your choice

Click to download installation
and licensing information

Click to download the Tutorial

Calculate ROK (9)
Would you like to calculate
the ROK on you existing
sub-processes or add another
sub_process?

| A | B |

Edit   Calculate

Submit Diagrams (6)

| | | |

Browse   Upload

ROK Results(10)
The ROK for Process ****** is
******.
The average ROK for the
functional area ***** is ******

Would you like to:
A. Add another sub-process
B. Create a new process
C. Re-engineer this process

| A | B | C |

Create New Process (2)
What is (are) the event(s) that
Trigger the process?
****
****
****
What is (are) the final output(s)
of your process?
****
****
****

| A | B |

Edit   Submit

Add Sub-Process Information (7)

Sub_Process_Name

Sub_Process_Desc

Sub_Process_Diff_Learning

Sub_Process_Rel_Learning_Time

Sub_Process_Ad_Avg_Learning_Time

Sub_Process_Numb_Emp

Sub_Process_Percent_Auto

Sub_Process_Annual_Exp

To-be Analysis (11)

**Flow_C
creating incremental
and radical process
redesign**

Assign Users (3)

| | Drop-down
List of user

(hold down the control key for
multiple selections)

Verify Sub_Process Information (8)

****** ********
****** ********
****** ********
******

| A | B |

Edit   Submit

Verify Users (4)

****** ********
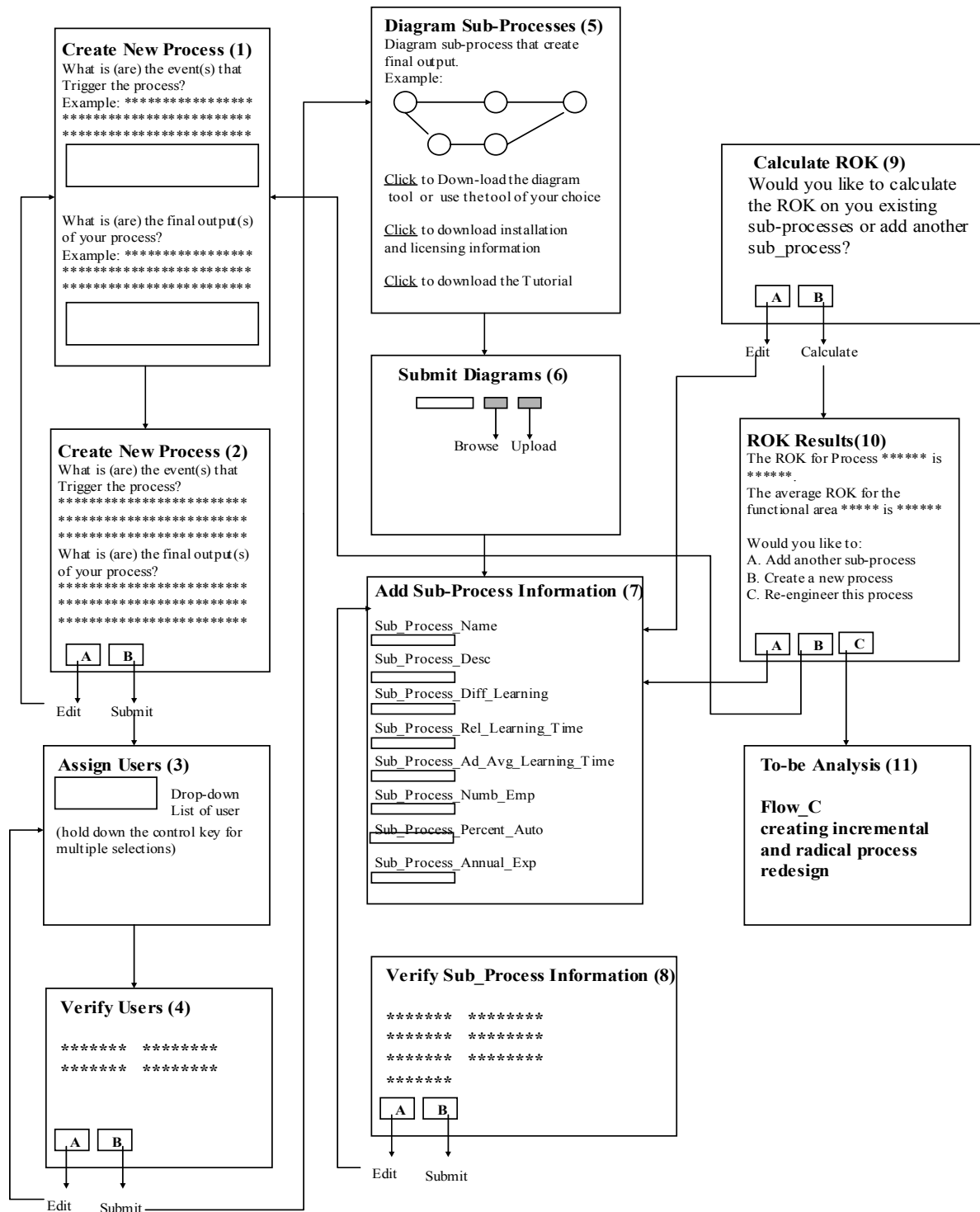****** ********

| A | B |

Edit   Submit

Figure 24.   Flow B

The first step of El Sawy's BPR model is to Scope the problem. The first screen forces the user to define the inputs to the process and also define the desired outputs. This information will be stored in the database for extraction and inclusion in the Process Scoping Report. Generation of the Process Scoping Report is not a functionality that is currently in the TITE but should be prior to live application.

The screen shot in Figure 25 shows the page that defines the boundaries of the process that is about to undergo redesign.
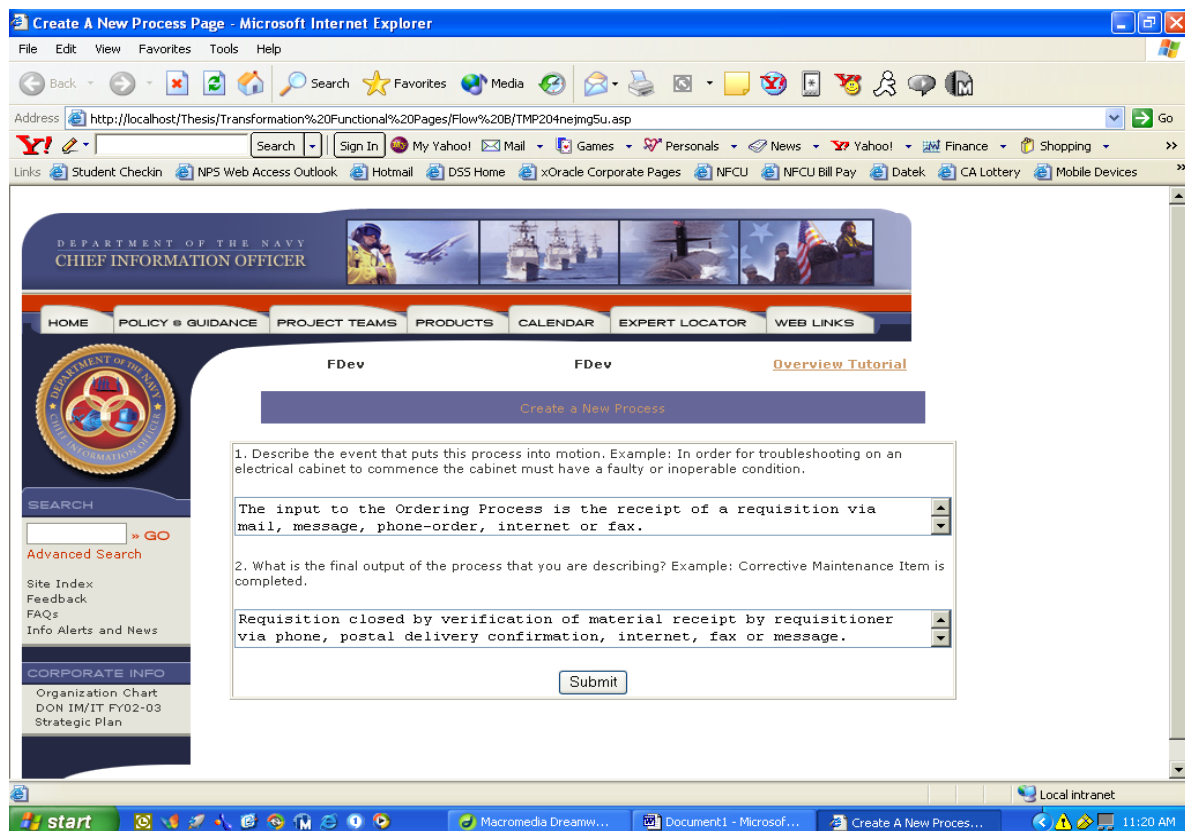

Figure 25.   Process Scoping Page Screen Shot

Once the user clicks the "Submit" button the user is sent to Figure 26 for verification that the information is correct. This submitted information appears in red.
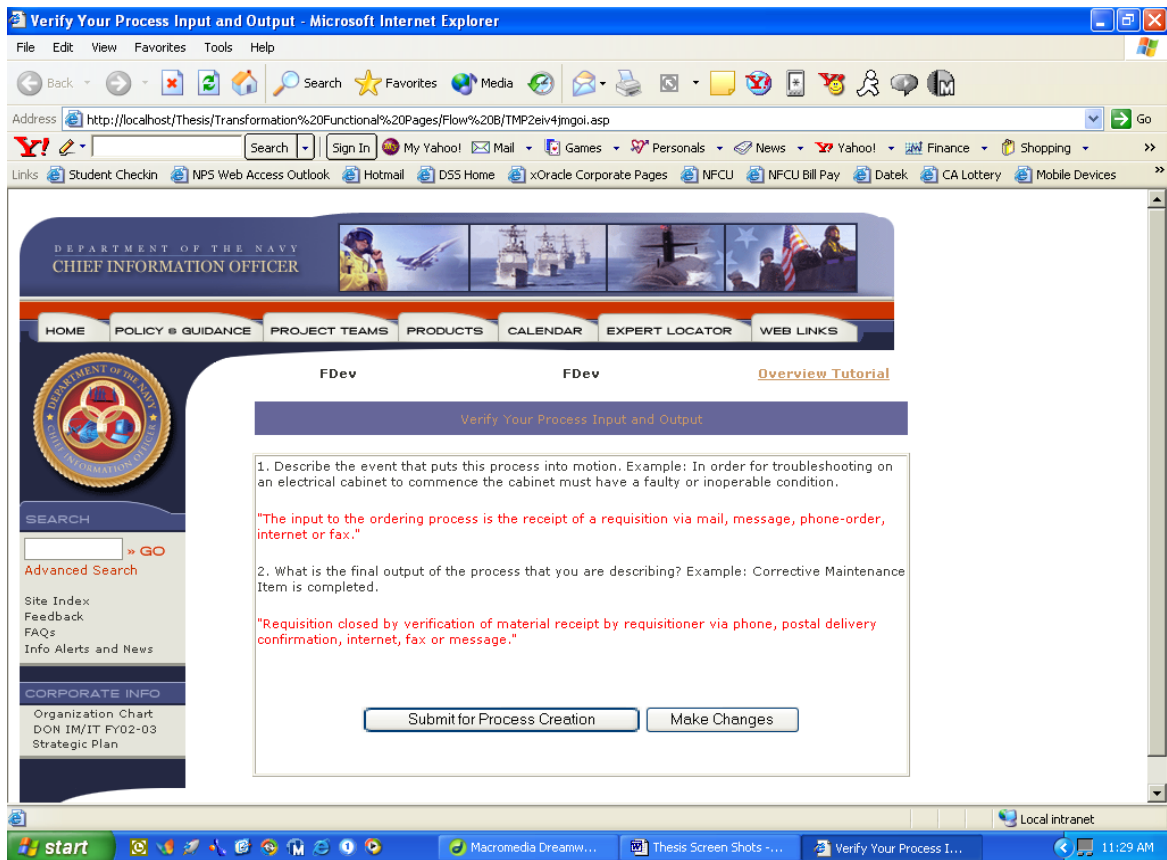
Figure 26.   Verify Process Scoping Information Page Screen Shot

This page will now allow the user to review the information for completeness and accuracy and then make changes which will take the user to the previous screen to edit their entry or if the information is correct then the user will submit the data to create a new process.   This submission will take the user to the user assignment page, Figure 27. This page will allow the CTT leader to add CTT members to the list of those that can access and edit the data associated with the process.
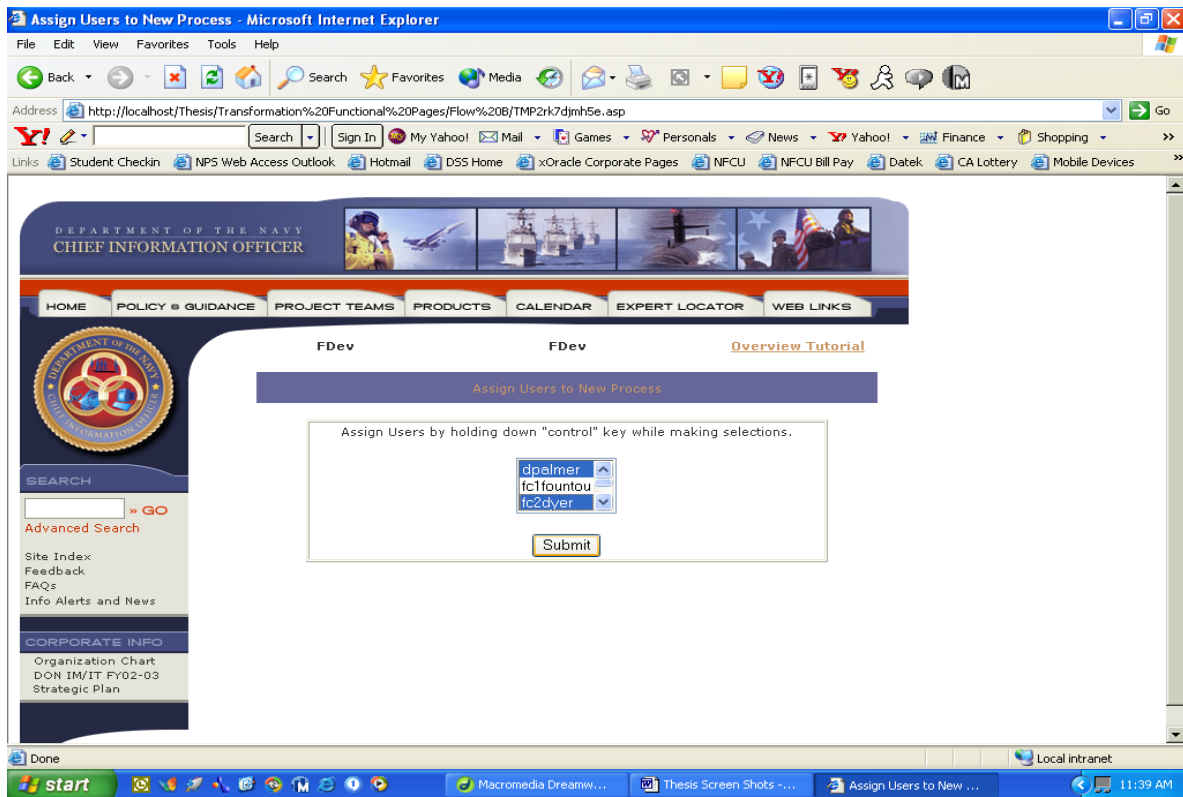
Figure 27.   User Assignment Page Screen Shot

The selection of users is dynamic data that is pulled directly from the database based on all users that are assigned to that particular command. A command may have several transformation efforts underway and therefore division of duties may be appropriately disseminated. Clicking the "Submit" button takes the users to a User Assignment Verification Page (Figure 28) which verifies that the appropriate users are the ones that the leader desires.

Figure 28.   Assigned User Verification Page Screen Shot

Again, as with the previous verification page the user may choose to edit users or submit as it stands. The submit button takes the user to the Process Modeling Page, Figure 29.
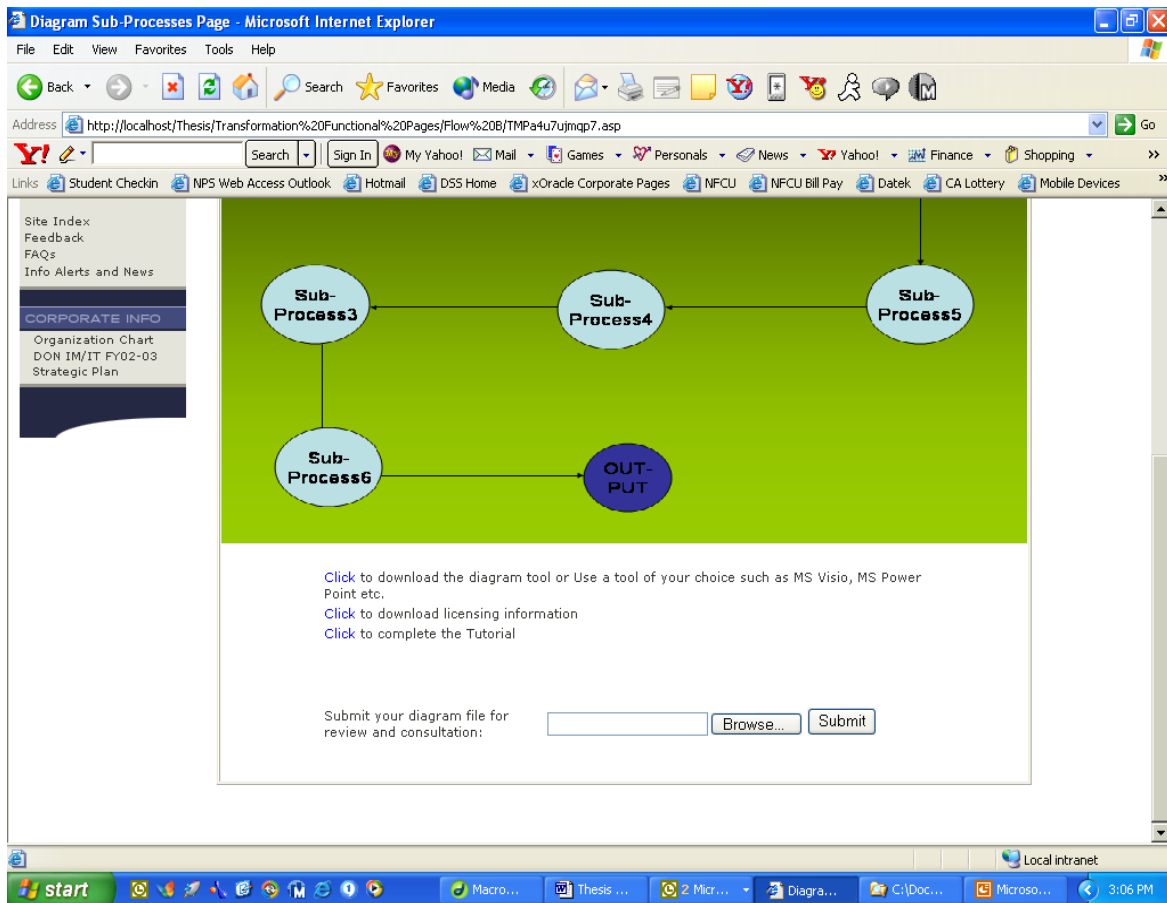
Figure 29.   Process Modeling Page Screen Shot

In the BPR Model, this is the beginning of Phase Two of the BPR Phase table. It is also very rudimentary in functionality but it allows the user to select a graphical tool to download or it also contains tutorials on how to diagram using graphical tools readily available such as MS PowerPoint or MS Visio. In addition, it will provide a list of data that is required in order to complete the KVA analysis. A desired functionality of this site would be to design a web-based graphical tool that would standardize the process modeling procedure and also details the process and sub-process steps. When the final model is completed, the user may then upload the file that depicts the process model to be redesign. The Transformation Center would then review this for suggestions and insight to the CTT Leader.

The next page visited will ask the user "How many" sub-process entities exists. The user would then enter in the appropriate number from the list/menu provided. See Figure 30.
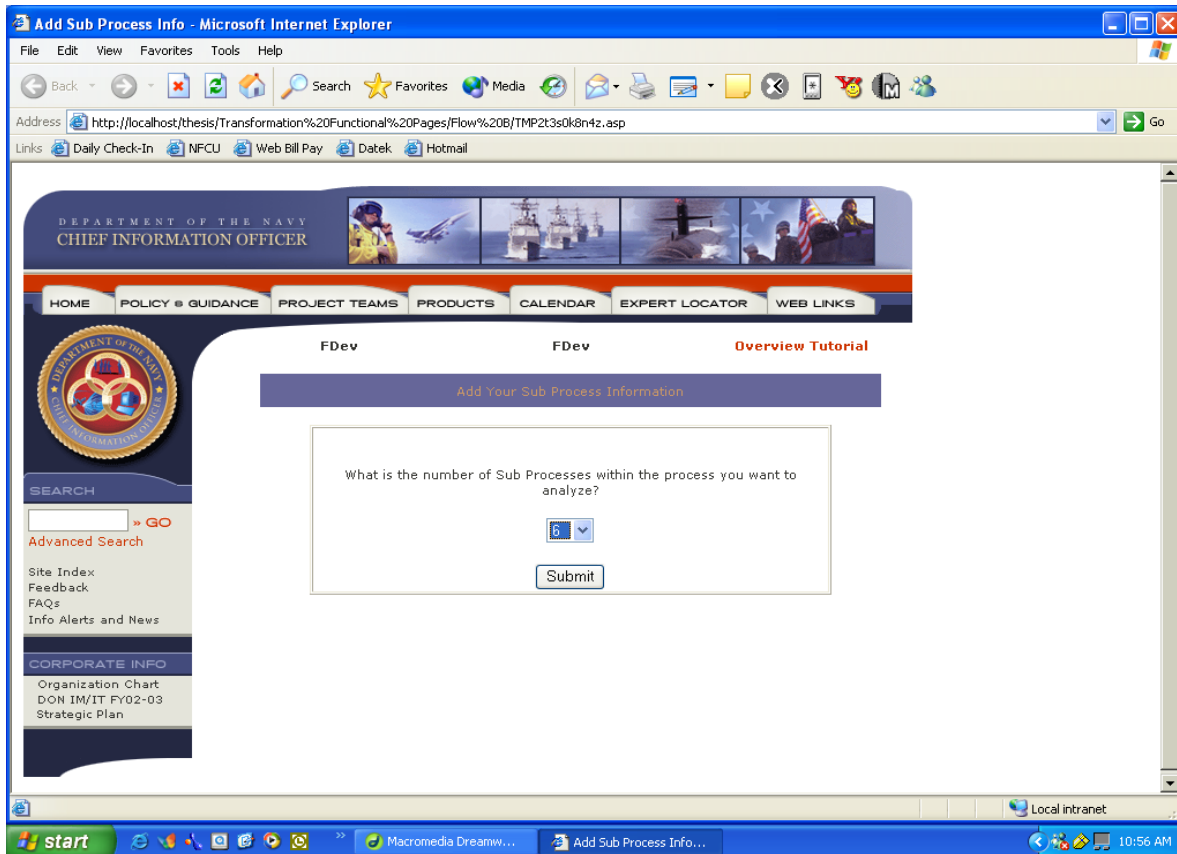

Figure 30.   Add Process Information Screen Shot

Once the use clicks the "Submit" button, the application will draw a dynamic matrix using the data provided by the user. The following page, Figure 31, shows a table very similar to the one depicted in Table 5.

Figure 31.   Process KVA Page Screen Shot

In the previous figure, the user chose six sub-processes. This matrix when generated is blank with the calculated fields showing all zeros. As the user inputs the data the calculated fields change appropriately based on the data provided. When the entire table is filled out completely the data can be reviewed on screen. The matrix also shows the user based on color discrimination how well his process is scoring even at the sub-process level. Keep in mind this first iteration is modeling the "As-Is" process. And it does not include the "To-Be" process because it has not been generated. At this juncture, this is strictly a baseline for which to redesign from. The user may choose to submit this process which the data in the matrix is transferred to the database for inclusion. Or the User may choose to go ahead and create a "To-Be" incremental

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process. This link will take the user to "Create a New Process" page and walk them through virtually the same procedure by which the "To-Be" process can be compared to the "As-Is" process by comparing the overall ROK.

VI. CONCLUSIONS AND RECOMMENDATIONS

In this thesis we approached the concept of transformation as an overall goal of the Department of Defense with the application of Business Process Reengineering (BPR) and Knowledge Value Added (KVA) as enabling processes and measurements.

Our approach to this process was to define what each of the three terms (transformation, BPR and KVA) means, what they do not mean and how they are relevant to the research questions addressed in Chapter I. Additionally we defined what the transformation support web-site would try to achieve in supporting the actions and goals of the DoD transformation effort. The pilot web-site has been created and the background documents explaining the site are the majority of Chapters IV and V.

A. RESEARCH QUESTIONS

The best way to describe the results of this study is to address the specifics of each of the initial research questions.

1. Can Transformation Be Defined?

Can transformation be defined, measured, standardized and implemented for the Department of the Navy using e-business concepts of Business Process Reengineering (BPR) and Knowledge Value Added? Through our literature review we encountered several different, but compatible approaches to application of e-business to BPR. El Sawy (2001) focuses his much of his definition of the definition of processes, their boundaries and the benefits that can be achieved in terms of business value. He further advocates that there should be a primary focus on essential processes that deliver outcomes rather than a focus on organizational structures.

Based upon the focus of the DoD transformation objectives as defined in the DoD Transformation Planning Guidance Document (2003), El Sway's perspective is right in line with what DoD hopes to achieve. While the scope of the overall DoD transformation effort has implications for virtually everything that the DoD does, this thesis is only

taking on the "How we do business" portion of the transformation scope. The other two sections, "how we fight" and "how we work with others", are not within the realm of what we have researched.

DoD has taken a three part approach to the implementation of the transformation strategy. The three parts are: Transformed Culture, Transformed Processes and Transformed Capabilities. El Sawy (2001) states that a BPR project will only be successful if top management is behind it. While the DoD transformation effort is far larger than a single project, it does meet the acid test of having senior leadership engaged in the process. Secretary Rumsfeld and other senior leaders in the Department are the driving force behind the efforts of transformation. The Business Management Modernization Project (BMMP) is one example of a BPR project that has been championed from the top. When implemented, the BMPP is intended to meet all three parts of the transformation strategy. In order to achieve the process and capability goals of BMMP, there will need to be a cultural change that emphasizes integration and cooperative efforts. Historically the DoD has had problems in this arena.

Knowledge Value Added (KVA) as defined in Chapters III and V, is the primary measurement tool that we are applying to the transformation effort. By measuring the amount of knowledge required for a process and measuring the cost of acquiring that knowledge, the KVA approach allows you to determine the return on knowledge (ROK). The benefits of the KVA methodology are that by comparing processes, both with an ROK value, it can demonstrate which produces the greater value.

In the DoD transformation effort, there is much concern with integrating processes and determining whose current process is the best. The BMMP programs charter includes the following three goals: Transform and Modernize business processes across DoD; Standardize and Integrate processes enabled by information technology and systems; and Capitalize of DoD strengths and infuse leading practices into DoD operations. With these three goals in mind; transform, integrate and measure, the KVA methodology had a great deal of applicability. If an organization wants to capitalize on strengths and infuse leading practices while integrating across current boundaries, there is a need for a measurement technique that can effectively measure current and transformed

processes in a way that shows all in the same way. KVA, through its simple, yet effective input, process, output assumptions, plus its ability to create a ratio of benefits and costs, can serve as an effective benchmark for DoD transformation.

2. Can E-Business Concepts Be Applied to Navy Transformation?

Can e-business reengineering concepts be effectively applied to the Department of the Navy's transformation efforts? Within the context of transformation and BPR, e-business reengineering concepts serve as a technical reference point for undertaking initiatives. El Sawy (2001) defines BPR with e-business as the process of re-thinking and redesigning business processes at both the enterprise and supply chain level to take advantage of internet connectivity and new ways of creating value.

The DoD is looking to transform its capabilities in terms of the way that we conduct business and the way that we work with others, to include other government activities as well as industries and other countries. Fingar (2001) explained that BPR using e-business technologies allows the value chain to change from a linear model to more of a web-like structure. This allows for the emergence of new alliances, new relationships, the ability to shift work from one organization to another with minimal impact on operations. This concept, which has been implemented in the private sector, can support the goals of the DoD transformation effort.

While there is no technology that can magically transform the way that an organization relates to its stakeholders, the use of e-business technologies holds great promise in being able make new relationships operable in a relatively short period of time. E-business technologies and processes have been maturing and there is much experience in both the DoD and the private sector. E-business technology may not be the solution for everything, but it can be a strong enabler of those processes where connectivity and "universal" access are crucial.

3. Can Navy Transformation Be Captured by KVA?

Can the Navy's transformation efforts be captured within the context of Knowledge Value Added (KVA) and applied enterprise-wide? Housel and Bell (2001) define the underlying foundation of the KVA method. Several of the components of that

foundation are: Change and value are proportional, the amount of value created as output is relative to the amount of change that takes place; change can be measured by the amount of knowledge that it takes to produce that change; therefore value and knowledge to make change are related. By accepting these assumptions, the KVA methodology can be applied to show that knowledge and change are proportional and can be used as surrogates for value.

Chapter V describes the process and demonstrates that the Return on Knowledge (ROK) equation, when consistently applied across an organization, can demonstrate the relative value of one process or function to another. The ability to see the relative value across an organization can make investment decisions more transparent. Rather than a focus on cost, or on intangible "benefits" that are difficult to measure, the ROK process can demonstrate where value lies within an organization.

In terms of the Navy and overall DoD transformation effort, Secretary Rumsfeld stated in the Transformation Planning Guidance, that part of the strategy for the realization of transformation is redefining the capabilities-identification process. This means that by redefining the process and procedures by which we identify and capitalize concepts, we can better define the capabilities and options for the future. KVA, while itself not a new capability, it is a "redefined process" that can support the identification of options for future capitalization.

KVA can be applied to existing processes as well as new options that are under consideration. By first determining the ROK for the existing process, a benchmark can be established to which the ROK of multiple options can be compared. Depending upon the value that exists in the current process, the ROK for change may or may not be radically different. Transformation is about radical change, so the decision point for acceptance of an option will be dependent upon the amount of change that the option provides. The real value of KVA and the determination of ROK, is that the amount of change, thus value, is actually visible.

4. Can a Web Portal Be Piloted?

Can a transformation web portal be piloted that will allow for the capture and benchmarking of BPR and KVA data for the Department of the Navy? Chapters IV and V

describe the technical and functional aspects of the pilot web-site to support DoD transformation. From a purely technical standpoint, the development of this capability has not broken new ground. The development team followed standard industry practices in the determination of requirements and application of standard commercial-off-the-shelf software.

From a functional view, the transformation web-site was able to incorporate the BPR principles and the seven steps of KVA. The design of the web-site is based upon flows that mimic the way a user might want to learn a new process. The primary flows of the site include tutorials, functional area selection and process creation using the BPR method and KVA analysis. This creates a logic based upon the way that a user might view himself in the context of the current organization.

While the data in the pilot site is fictional, the process steps incorporated into the site are based upon defined BPR and KVA processes. By starting with a definition of inputs and desired outputs, the user scopes the problem. He can then enter the relevant information for the sub processes that comprise the current situation. Learning times, people involved percent of automation and costs are entered, which provides a baseline, in terms of ROK, for the current process. The user can then create new options for process reengineering that will be compared to the baseline for evaluation and possible selection.

While the pilot site is not ready for deployment, it is functional and can be used as a way to test the application of BPR and KVA to DoD transformation.

B.   RECOMMENDATIONS

This thesis is intended to explore the use of BPR and KVA to the DoD transformation effort. Secretary of Defense Donald Rumsfeld has challenged the department to think outside of the box and move forward towards a radically transformed future. His challenge is broad-based with high-level strategic goals as laid out in the transformation planning guidance (2003).

The second part of this effort was to create a web-site that could serve as a pilot effort for DoD users to create, evaluate and share transformed processes. Based upon our research and analysis, the following recommendations apply for continued research in these areas.

1.   Use of BPR and KVA

While there are published studies about the effectiveness of BPR in government and industry, there needs to be further research on the application to KVA to the overall BPR process. Professor Tom Housel of the Information Sciences Department at the Naval Postgraduate School conducts a class that designs and creates BPR with KVA solutions for customers in government and industry. The results of these studies hold much information about the efficacy of the process and if tracked, over time, could provide beneficial data to the leaders of DoD.

2.   Additions to the Transformation Web Portal

The current state of the BPR web portal is that of a pilot effort. The basic functionality has been incorporated, but could be greatly enhanced with the following changes:

- Determination of a DoD animated simulation package and its integration into the software modeling processes. This would help the user to better determine whether there were bottlenecks or unseen flow disconnects in both the current and future business processes.

- Creation of on-line tutorials to teach the users how to model and evaluate processes. This would enhance the overall effectiveness of the BPR process by ensuring that all users had a similar frame of reference. The tutorial process is incorporated into the overall web portal architecture, however the actual tutorials have not been developed.

- Development of a Process Scoping Report that would be provided to users after they have defined and entered the scoping data into the system

- Incorporation of a web-based graphical design tool into the portal architecture. Currently a user must design their processes offline and upload them to the portal. The benefit of an integrated package would be standardization of design and display.

The inclusion of this functionality would greatly enhance both the usability and capability of the DoD BPR web portal. Current capabilities of the pilot site are sufficient to test and evaluate the overall concept of BPR evaluated through KVA, but it is not

ready for full-scale implementation. The Department of the Navy (DoN) E-Business Operations Office in Mechanicsburg, PA is the central evaluation and funding activity for DoN e-business initiatives. Funding and support from this activity could greatly enhance the prospects for the future deployment of this initiative.

3. **Implications of Research for DoD/DoN Transformation Policy and Operationalization**

a. ***Policy based upon BPR defined and promulgated.*** This policy should encompass the establishment of best practices and benchmarks based upon KVA and individual ROKs. In order for the best practices to be established and available to the DoD/DoN, an operational version of the web-site described in this document should first be made available to the community at large.

b. ***Policy driven from BPR experimentation not vice versa****.* Experimentation, in this context denotes a scientific approach with monitored test cases, where the befer and after processes are evaluated and a determination is made as to the efficacy of the changes. By taking this approach, there needs to be room for failure. Not all cases of BPR are going to prove to be worthy of implementation or further study. By using an approach such as a academic test bed (NPS) for the experimentation, the cost of failure can be minimized, while providing an excellent learning capability for the future leaders of the DoD/DoN.

c. ***Participation and evaluation by the Navy Information Professional (IP) community and major DoD/DoN customers.*** The establishment of the IP community in the Navy as a cadre of Officers whose career is based upon the use of information and information systems has provided a built-in group for BPR evaluation. By using the talents of the IP community with large DoD/DoN activities, there is great promise of objective and beneficial analysis.

d. ***Need for rapid prototyping and proof-of-concept web sites.*** In order for the existing pilot web-site to become operational it is important the concepts laid out in this thesis are accepted and made operational. An operational version of the transformation web site needs to be made available to the activities that are pursuing e-

transformation before they undertake large scale efforts. Once resources are committed, many activities would be hesitant to change direction.

   e.   Use e-transformation savings to re-capitalize the Navy, by shifting resources from the back office to the "point of the spear". Through effective use of BPR, costs can be reduced by those activities that are in business to support the war fighter. Those savings can be used to recapitalize the fleet forces and improve the operational capabilities. However, improvement can only be determined if there is a consistent way to measure the changes. The concepts of KVA with the ROK measurements are an effective way to use a consistent measure across different processes.

   f.   Redefine the value chain with the war fighter at the center and all DoD/DoN activities in a supporting role. Ensure that 80% of the effort is in the improvement of support to the war fighter rather than the shore establishment.

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